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# Analysis of standardized bar coding and the User/Buyer Electronic Catalog's potential for effecting change within the Department of Defense

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# NAVAL POSTGRADUATE SCHOOL
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# THESIS

**ANALYSIS OF STANDARDIZED BAR CODING AND THE USER/BUYER ELECTRONIC CATALOG'S POTENTIAL FOR EFFECTING CHANGE WITHIN THE DEPARTMENT OF DEFENSE**

by

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March, 1996

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## ABSTRACT

The Department of Defense has been relying on business practices and material management methods that date back to the 1940s and before. Once the premier innovator in the field of logistics, the DoD has fallen woefully behind commercial businesses in the past few decades. Advances in Electronic Commerce/ Electronic Data Interchange (EC/EDI) technology have far outpaced the DoD's ablility to keep up. Challenged by President Clinton in 1994 to reinvent government and to modernize and streamline business practices, the DoD has since been studying applications of EC/EDI that will allow them to integrate successful logistics ideas into DoD operations. This thesis examines an exciting application of EC/EDI currently under review - the Electronic Catalog - and its potential impact as a catalyst for change within the DoD. Reviewing 3M Corporations operational CONNECTSUS User/Buyer Electronic Catalog system against proposed Defense Logistics Agency initiatives, this thesis looks at the benefits to be gained by the DoD. Integral to the thesis is a review of standardized bar coding and how it fits into, and enhances, EC/EDI.

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# I. INTRODUCTION

*"...[O]nly 20 percent of the American people trust the federal government to do the right thing most of the time. Thirty years ago, 76 percent trusted the government."*
- Vice President Al Gore, Jr.

## A. BACKGROUND

Military logistics has entered an increasingly challenging period of transition, one that will test the Department of Defense (DoD) to its fullest. Faced with both difficult financial decisions and closer public and government scrutiny of daily operations, the DoD must not only fulfill a responsibility as guardian of public funds and trust, but do so while reengineering itself to support modern warfare with a precise, agile response instead of the historical "en masse'." [Ref. 1]

While streamlining initiatives occur with some regularity within the DoD, the current Clinton/Gore administration has made "reinventing government" the cornerstone of their plan to return public trust in the federal government and its processes. Labeled the "trust deficit" [Ref. 2] by President Clinton, restoring public trust has become the impetus by which his administration plans to significantly change what the federal government does and how it does it.

Two recent developments, which are helping to shift some

of the original suppositions on which traditional public and private sector management theory have been based, are:

1) a new understanding of how best to employ human capacity; and

2) the new role of information technology in transforming the manager's job. [Ref. 2]

How best to employ human capacity admits the fact that human skills are a largely untapped resource in any organization. Private sector businesses cannot afford idle workers, costly and time consuming processes, or the ineffective use of any asset — human or machine. Redefining job descriptions, researching job processes, searching out inefficiencies within the organization, and looking at the cost of each action in the chain of production of a good or service, has helped commercial enterprises go beyond simple process improvement to full-scale reengineering.

It has been the incredible improvements in the field of information technology that have allowed management the opportunity to design, integrate, and implement reengineering initiatives. The ability to go "on-line" and analyze reams of data in minutes rather than the weeks it would have taken before the advent of microcomputers, means each manager is now responsible for better understanding his job. Data must be effectively digested, evaluated, and acted upon — quickly and efficiently. [Ref. 3]

To its credit, the DoD has taken the lead in aggressively

pursuing new initiatives and policies that comply with current and expected Executive and Congressional directives. Probably the best known and most comprehensive initiative is the self-imposed examination of the Department's infrastructure, known as the Bottom-Up Review (BUR). From BUR findings, the DoD was made aware of the widening technology gap between military logistic practices and those used in the civilian sector. Once the premier innovator in material management and movement, the armed services have fallen woefully behind in this field. [Ref. 1] Realizing the need to at least toe the line with business — if not again regain its preeminent role — the DoD has been actively pursuing various technological advances in the field of logistics and transportation management in order to meet the changing needs and requirements of the armed services.

Foremost in facing the logistics challenges that lie ahead, the Defense Logistics Agency (DLA) has assumed the lead in researching, developing, and adapting common business practices to DoD applications. One technology that seems to entertain the most promise for revolutionizing and revitalizing the way DoD approaches material management is the application of an accepted, standardized commercial bar code technology, notably the Uniform Product Code (UPC), coupled with electronic data interchanges for material procurement, tracking, and inventory management. [Ref. 4] This thesis focuses on the potential application of this technology within

the DoD.

## B. CURRENT SITUATION AND RELATED PROBLEM

The armed services have developed various ways to classify material; National Stock Number (NSN), National Item Identification Number (NIIN), Federal Supply Group (FSG) and Federal Supply Class (FSC), etc. Within the Department of the Navy (DoN) most of these stock classifications apply, causing confusion, redundancy, and most tellingly, a continuation of out-dated business practices. As our civilian sources of supply have continued to evolve and revolutionize their material management methods, they have had to retain antiquated and outdated methods of packaging and marking material in order to meet military requirements that were promulgated in the 1950s and 1960s. These practices increase the cost of packaging for the supplier and consequently, the higher costs are charged back to the DoD when material is contracted. Although an actual dollar figure is not available, estimates — based upon an industry average that 3 percent of the cost of material to the U.S. government is tied up in repackaging and relabeling — supports the claim that almost $1.5 billion a year is charged to the DoD simply because of DoD mandated packaging and labeling requirements. [Ref. 5]

Allowing that there will always be those items of a consumable nature that must be packaged in accordance with certain military standards, either negotiated in the initial

purchase contract or in accordance with Military Standard 129M (Marking for Shipment and Storage), it is probably also safe to assume that there are hundreds of thousands of commercially packaged items that can and should be bought "off-the-shelf." Prime examples of such include all office and office cleaning supplies, medical supplies, general hardware, commercial computer hardware and software, restaurant and galley supplies, as well as certain clothing items and almost all commercially available, non-ordinance related hazardous material (paint, petroleum, oil, lubricants, etc).

## C. OBJECTIVES AND SCOPE OF THESIS

In this thesis, we look at a recently available application of commercial Electronic Commerce/Electronic Data Interchange (EC/EDI) technology that has been developed by a consortium of 3M Corporation, General Electric, and Thomas Publishing. Known as a User/Buyer Electronic Catalog — or U/B ELCAT for short — the CONNECTSUS® system promises to revolutionize DoD contracting, shipping and receiving, and material management practices. Using standard bar code technology and a stand-alone personal computer with Windows capability, U/B ELCAT could prove to be the integral step to realizing inventory reductions due to Just-In-Time (JIT) ordering

procedures and the elimination of waterfront SERVMART/HAZMART[1] functions, as well as cost reductions in both regional contracting and item manager functions.

## D. METHODOLOGY

Current applications of UPC bar coded technology in the civilian sector are analyzed through an exhaustive literature review of trade journals, applicable DoD directives concerning bar coding and labeling of material, Uniform Council Code (UCC) implementation and training material, Harvard Business School case studies, and internal DLA memoranda. In addition, we have attended numerous conferences co-sponsored by DLA and the UCC designed to help review applying commercial practices to DoD processes. Finally, several on-site and teleconference interviews were conducted with individuals at each pilot program site;

a) Defense General Supply Center, Richmond, Virginia,

b) SERVMART, Fleet Industrial and Supply Center, Norfolk, Virginia,

c) Portsmouth Naval Hospital, Portsmouth, Virginia,

d) Defense Personnel Supply Center, Philadelphia,

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[1] SERVMART and HAZMART are Navy acronyms for self-service, warehouse-type shopping centers that cater to fleet and shorebased commands. Similar to the Air Force BSS (Base Service Store), they offer quick, one-stop shopping for commercially available material such as office supplies and paper products (SERVMART) or controlled materials like paint, paint thinner, and aerosol sprays (HAZMART).

Pennsylvania, and

e) 3M Corporation, Advanced Technologies Division, St. Paul, Minnesota.

## E. DEFINITIONS AND ABBREVIATIONS

A list of acronyms used within this thesis is presented in Appendix A. Working definitions of terms and concepts used will be provided within the text of the thesis as deemed necessary.

## F. ORGANIZATION OF THESIS

The thesis is divided into six chapters. Chapter I presents the problem, states the objective of the thesis, discusses the methodology, and provides an introduction to the study as well as some perfunctory background material. An introduction to material bar coding schemata and the concept of Electronic Commerce/Electronic Data Interchange will be reviewed in Chapter II. In Chapter III we present the User/Buyer Electronic Catalog and its uses, and tender some benefits and limitations of the system. Current DoD initiatives with Electronic Commerce/Electronic Data Interchange (EC/EDI) technology are extensively reviewed in Chapter IV. In Chapter V we analyze the differences and similarities between commercially available EC/EDI technology and proposed DoD systems. Finally in Chapter VI, we present a summary of the thesis efforts, conclusions from the research, and provide

recommendations for further data collection and system implementation.

# II. BACKGROUND

*"Reengineering is fast becoming the "panacea of choice for an increasing array of organizational maladies."*

- Robert D. Boyle, CMA

## A. INTRODUCTION

In an effort to stay one step ahead of the Base Realignment and Closure (BRAC) Committee, the DoD has initiated numerous consolidations, process reviews, and reengineering initiatives to ensure that the armed services not only retain and improve their ability to serve the national interest, but do so in the face of an increasingly austere financial environment. The task at hand is not only a monumental one, it is also the beginning of a fundamental and compelling change in the military's "corporate culture." Regardless of the reasons behind the drive to change how we do business, few can doubt the importance of these reforms. The first heady rush of innovation however has also lead to a plethora of initiatives finding their way onto the table — some good, some bad, and some indifferent.

This thesis focuses on one initiative that was first presented to the DoD by the Uniform Council Code and the 3M Corporation in response to the Federal Acquisition Streamlining Act (FASA) of 1994. The FASA, following in the wake of earlier Defense Management Report Decisions (DMRDs) such as

DMRD 901, Reducing Supply System Costs; DMRD 915, Reducing Transportation Costs; and DMRD 925, Corporate Information Management, laid out specific Electronic Commerce/Electronic Data Interchange (EC/EDI) milestones with accompanying completion dates. Realizing that standardized business practices were the key to successful commercial applications, UCC and 3M presented strong arguments for applying commercial labeling (and its applicable packaging standards), to military use.

Both 3M and the UCC have invested considerable time and research into studying and implementing EC/EDI systems. FASA was enacted in order to take advantage of commercial applications of EC/EDI technology and simplify the acquisition process. It is beyond the scope of this thesis to detail the wide sweeping changes that FASA has wrought, however it is safe to state that FASA has forced the Federal Government to jump into the same technological arena that most large businesses have been competing in for years.

Standardized business practices and language are what make the current electronic commerce revolution possible. Business leaders world-wide have recognized the need for commonality in procedures to facilitate their transactions. This has helped to spur industry leaders to work together in solving the problem and was the driving force behind the creation of the Uniform Code Council. Not surprisingly, the foremost commercial application of standardized item identifi-

cation is the UCC's Uniform Product Code (UPC) bar code. The UPC can be found on almost all subsistence items, most general consumables, and on an ever increasing number of repair part items.[2] In order to expand upon this idea, a thorough understanding of UPC technology, applications, and limitations is required. In addition, a brief overview of Electronic Cataloging and the concept of Electronic Data Interchange are required in order to familiarize the reader with both concepts. This chapter is designed to assist in this endeavor and to briefly identify DoD efforts in this arena.

## B. PRODUCT IDENTIFICATION/UNIVERSAL PRODUCT CODE

When discussing UPC bar codes, one must first differentiate between the three bar code "types" endorsed by the UCC in their effort to standardize business. These include the UPC, both A and E structures; the EAN (European Article Number, also known as the World Product Code), including the 8 and 13 structures; and the SCC-14. A fourth version, the UCC/EAN-128 Application Identifier expands on the above bar codes in order

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[2] In the context of this thesis, subsistence items describes grocery foodstuffs/provisions. General consumables are those items used in the normal day-to-day operations of an office or work space, and include, but are not limited to, cleaning and office supplies, disposable paper and plastic products, and nonexclusive, non-military repair parts such as copier supplies, general hardware, paint, and similar materials.

to provide an improved shipping document.

The Universal Product Code (UPC) and the European Article Number (EAN) are very similar and completely compatible. The basic difference between the two lies in the "country of origin" or "country flag" that starts each EAN bar code. UPC-A codes consist of 12 digits, each character being made up of two bars and two spaces. EAN-13, with the single "country of origin" character, is 13 digits. The structure of each is displayed in Figure 1.

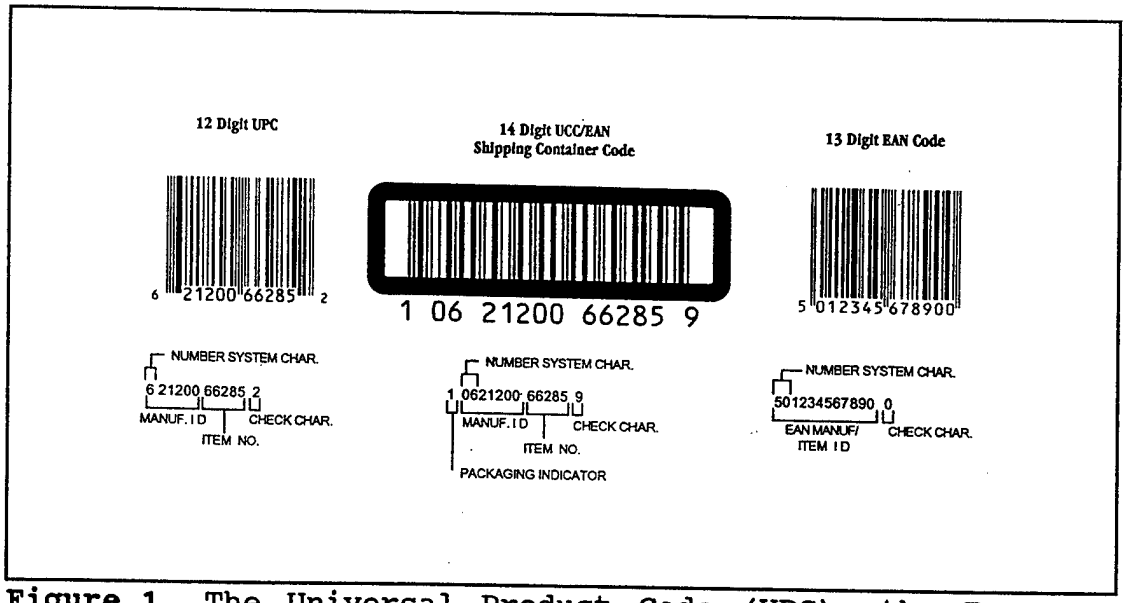


**Figure 1.** The Universal Product Code (UPC), the European Article Number (EAN), and the SCC-14 Shipping Container Code. [From Ref. 6]

Figure 1 also presents the 14 digit UCC/EAN SCC-14 shipping container code used to identify fixed content multipacks, shipping containers, pallets, and unit loads. Because shipping containers are often scanned in an environment of questionable cleanliness, that may vary considerably

in the transportation logistics pipeline, they usually are built of sturdier, rougher material than product packages. And as they are often scanned at a distance (forklift/bay door scanners, etc.), they use a bar code technology that is designed for, and tolerant of these conditions; the Interleaved 2-of-5 (ITF). [Ref. 6] ITF is highly compressed, numeric only, and widely used in warehousing, heavy industry, and some transportation industries.

Bar codes are simply a means by which material may be identified by machine. Though their formats may vary from one application to the next, their purpose is to allow standardized business practices and processes within a given industry. The UPC is a simple format that identifies the company and the item as explained in Figure 2. The EAN goes a step further by providing a single digit country-of-origin identifying code. Either code can be applied to a product and need not be duplicated in each.

The beauty of standardized bar coding is the ease with which the technology can be used amongst different industries/companies/automated data systems. The UCC's UPC, along with the comparable EAN code, are recognized as the widest used schemata. Required on all subsistence items and found on almost every commercial retail item, it has exhibited phenomenal acceptance and growth within the past two decades, both domestically and in foreign markets. Table 1 provides a brief overview of UPC/EAN status, industry wide.

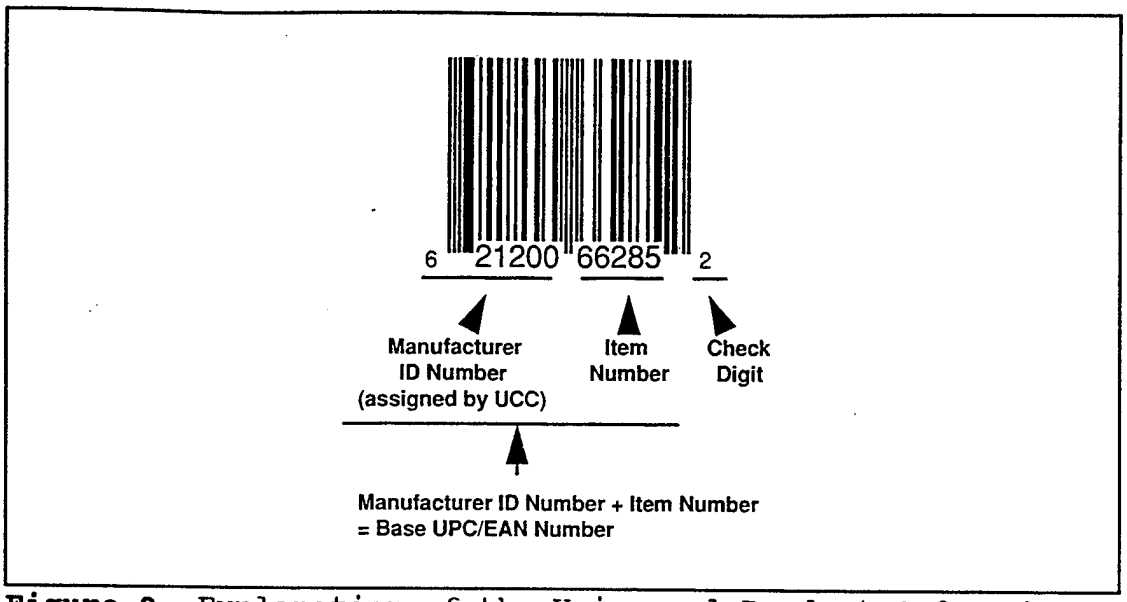


**Figure 2.** Explanation of the Universal Product Code Schemata. [From Ref. 6]

UPC-E and EAN-8 codes, both of which are 8 digit codes, are not used by companies dealing with the DoD and are reserved for European transactions. As such, they will not be discussed in this thesis.

The UCC/EAN-128 Application Identifier (AI) standard extends the existing UCC and EAN item and shipping container bar code standards to include additional information about products and shipments. The 12-digit UPC will be used in the identification of retail products, the SCC-14 used for primary identification of standard shipping containers. The UCC/EAN-128 AIs are prefixes used to define bar code data fields. [Ref. 7] Each prefix uniquely identifies the meaning and format of the data field following it and it is the AI that allows for customized shipping labels and item barcoding. Appendix B lists currently recognized Ais.

**Table 1.** UPC-EAN CURRENT INDUSTRY STANDARDS [Ref. 8]

| INDUSTRY | UPC/EAN USE OR STATUS |
|---|---|
| Automotive/transportation | Used in aftermarket. Being considered by OEM (Original Equipment Manufacturer) for parts. |
| Construction/building | Being implemented - driven by DIY (Do-It-Yourself) retail outlets. |
| Consumer/retail | *Endorsed and used globally.* |
| Electrical | *Endorsed and widely implemented.* |
| Electronics/computers | Being implemented for retail products. |
| **Federal Government & Department of Defense** | Accepted for some consumer items, but not DoD and other non-consumer. |
| Furniture | Moving towards endorsement. |
| Health Care | Moving from HIBC (Health-care Industry Bar Code) toward UPC/EAN. |
| HVAC (Heating, Ventilation, Air Conditioning) & Plumbing | *Endorsed and widely implemented in the U.S.* |
| Industrial Manufacturing Supplies | *Endorsed and widely implemented in the U.S.* |
| Office Products | *Endorsed and widely implemented in the U.S.* |
| Telecommunications | *Endorsed. Beginning implementation.* |
| Utilities | *Endorsed. Beginning implementation.* |

Bar coding, despite the system employed, does have limitations. The UPC is a fixed length bar code as compared to Code 39; known as 3-of-9, which is generally used within the DoD and is of variable length. The UPC and EAN are also numeric data only, as compared to the 3-of-9's alphanumeric format. When discussing the UCC/EAN-128, however, the Ais allow for alphanumeric data and a variable length data format. While not the topic of this thesis, revolutionary changes in bar code format will probably see both the UPC and Code 39 systems eclipsed in the packaging field by the new 2D bar code system, which allows encrypted data of any sort to be formatted in a 2D bar code that is highly resistant to shipping damage, can hold enormous quantities of data, and is as easily read and applied as current coding systems.

UPC bar code technology has been available for DoD use since its inception as a wholesale/retail subsistence item identification schemata in the early 1960s. In this circumstance, it has been employed successfully within the DoD; both retail commissary stores and fleet/unit provisioning commands interact with their commercial suppliers by using UPCs.

While there are no exact figures for the number of non-subsistence line items carried in the DoD supply system that are already bar coded using the UCC UPC symbology, Defense General Supply Center (DGSC), Richmond, Virginia estimates that more than fifty percent of their 700,000-plus line items

are bar coded. [Ref. 9] With annual sales in Fiscal Year 1995 at DGSC alone exceeding $847 million, any initiative that offers considerable reductions in ordering costs, as well as potential savings associated with inventory reduction and transportation discounts, can have a significant impact on DLA and DoD operations and budget.

Bar coding alone cannot bring about the fundamental changes that DLA has been discussing, however. As mentioned earlier, bar codes, in one form or another, have been used in inventory management, for transportation documentation, and in some cases, for ordering material, albeit manually. Until recently, there was very little concerted effort to maximize their potential, and to use them as a means to standardize and streamline DoD/DLA business practices. To this end, we need to discuss Electronic Cataloging (ELCAT) and Electronic Data Interchange (EDI) initiatives within DoD.

## C. ELECTRONIC CATALOG/ELECTRONIC DATA INTERCHANGE

Electronic Data Interchange (EDI) is simply the electronic communication of formatted transactions between business partners using computers. The "formatted" part is why UCC bar coding schemata are so important to this medium.

In a presentation given by Allen Messerli, Manager of 3M Corporations Advanced Technologies Division, the benefits and opportunities of EDI were spelled out for both DLA and commercial vendors who do business with the government. [Ref. 8]

Specifically, EDI provides:

* Faster customer service
  - Avoid mail time and work queues
* Improved accuracy
  - Reduce transcription and key entry errors (customer/contractor/vendor)
* Better use of people
  - Decrease phone time
  - Eliminate manual transcription and stock number look up
  - Eliminate key entry
* Lower distributor/customer inventories
  - Decrease lead times

These same benefits and opportunities would accrue to DoD commands through the use of EDI technology at Military Traffic Management Command (MTMC) and in the context of other related defense transportation operations. [Ref. 10]

The parallels between the DoD Supply System and 3M Corporation are striking. Both are extremely large, diverse entities that require a complex logistics network to handle a variety of tasks that include warehousing, distribution, contracting and procurement, product identification (cataloging and stock numbering), and research. These tasks are performed each day, around the clock, nationally and worldwide. In an effort to maintain their competitive advantage, as well as advance their market share, 3M Corporation has

taken efforts to review their cost data for purchase order processing. Granted, DoD and DLA are not usually thought of as profit motivated enterprises, however the comparison of 3M data against Naval Air Warfare Center (NWCA) and DLA estimates, Figure 3, are reason enough to warrant further review of applying similar technologies to DoD processes.*

As indicated in Figure 3, 3M believes that its successful foray into the realm of EDI has had a remarkable effect on improving how they conduct business. It has affected their profitability, increased sales, while reducing expenses. Order entry costs alone (the process of keying in a manually

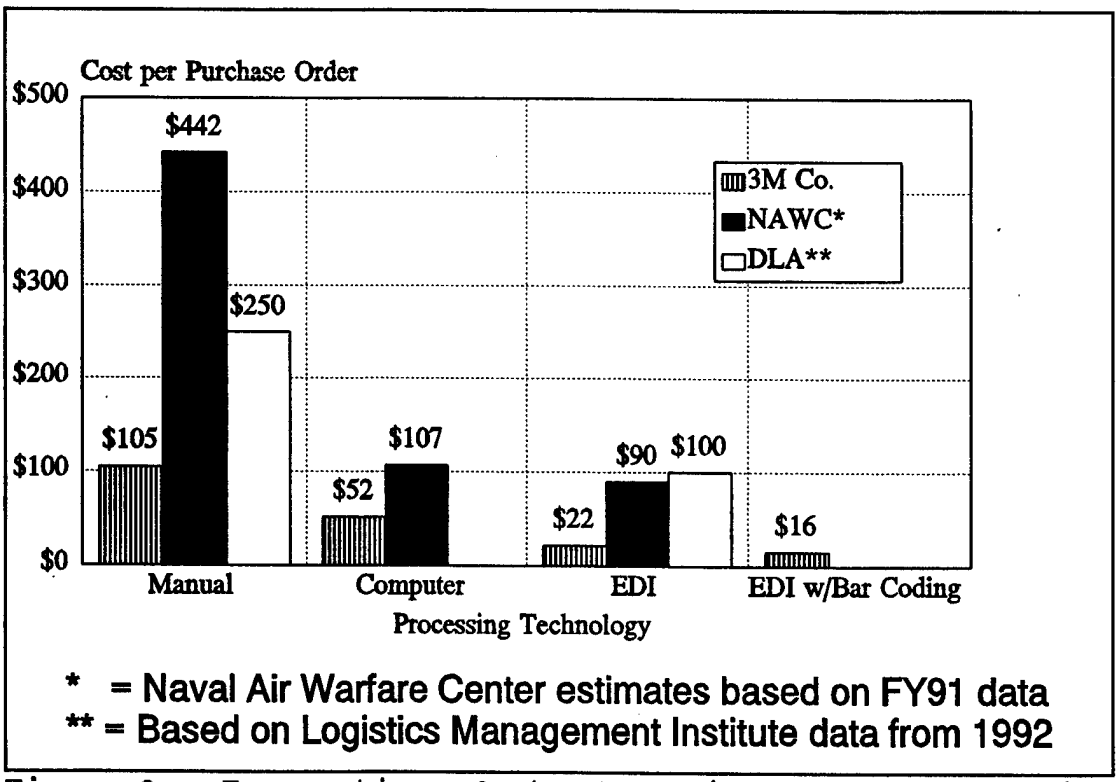


**Figure 3.** Transaction Cost Comparison Per Processing Technology.

received requisition or correcting data field errors) have been reduced by $3.50 per order. [Ref. 8]

DLA has aggressively sponsored initiatives that look at innovative ways to improve customer service, reduce inventory levels, lower their operating costs, and most notable - however belated, exploit their national buying leverage.

With this in mind, DLA tasked the Defense Logistics Service Center (DLSC), already responsible for assigning National Stock Numbers to procured items and maintaining the DoD database catalog for all military material, with developing an Electronic Commercial Catalog. DLSC's focus is on providing DoD customers with an on-line catalog offering both DLA stocked material as well as information on items not carried within the DoD supply system but supplied by commercial vendors with whom DLA has a contract. [Ref. 11]

DLSC has been extremely aggressive in their definition of the scope of the initiative. They plan to provide not only on-line search and ordering capability, but also to enable the customer to view an image of the selected item and review any necessary technical documents. The sheer numbers entailed — military line items, contractor plans, blueprints, video images, current contract and blanket purchase agreements, and the time required to input the information into any sort of cohesive, accessible, reliable, readable and timely database — make this one of the most ambitious and wide-sweeping initiatives in recent DLA history. This effort is discussed

further in Chapter IV.

Chapter III will introduce the U/B ELCAT (User/Buyer Electronic Catalog) Corporate Electronic Catalog designed for use by DoD commands by 3M, GE, and Thomas Publishing and now known by the trademark name "CONNECTSUS." This system, already in place at some military commands overseas, provides almost all the benefits that DLSC is proposing for their system and has the capability of expanding to include DLSC's most ambitious plans.

* - Data presented in Figure 3 — with the exception of 3M cost data — should be considered as very gross estimates of actual cost. Until recently, the process of capturing cost data was not done within the DoD. NAWC data represents the costs to process a manual small purchase, an automated BANKCARD transaction, and using SPEDE. DLA data is from a source at DLA who wishes to remain anonymous.

## III. THE USER/BUYER ELECTRONIC CATALOG - "CONNECTSUS®"

*"...[It takes] guts to give up on the paper. Paper is a form of security, and something is lost when it's given up, something that must be replaced by mushy old trust..."*
- Tom Peters
"A Passion for Excellence"

### A. INTRODUCTION

There have been sporadic attempts at initiating "catalog" sales systems in the DoD for years. Until recently, these endeavors have not greatly enhanced the military supply/-distribution system, nor have they significantly improved customer service levels. The problem lay in their format — paper.

The General Services Administration (GSA) publishes the most widespread and easily readable catalog used by the DoD and other government agencies. Organized by Federal Supply Group and Class, the GSA Supply Catalog presents "brief but comprehensive notations including the item's possible uses and characteristics, including color, size and capacity. They may include government and industry specifications, standards, drawings and Commercial Item Descriptions (CIDs). Federal and Military Specifications may also be referenced for many items." [Ref. 12] Additionally, many items are identified by photograph.

The GSA Supply Catalog also provides manufacturer part

numbers including the UPC symbology for participating companies, as can be seen in the example for Clorox products shown in Figure 4.

***Clorox P/N 44600-00020***

. . . . . 7930-01-356-9203
390ml bottles . . . . . Buy on Demand
Bx (contains 9 bottles) . . . . . See page 5.

***Clorox P/N 44600-00026***

. . . . . 7930-01-356-9202
780ml bottles . . . . . Buy on Demand
Bx (contains 9 bottles) . . . . . See page 5.

***Clorox P/N 44600-00059***

. . . . . 7930-01-356-9204
1.17L bottles . . . . . Buy on Demand
Bx (contains 6 bottles) . . . . . See page 5.

Contains Bleach

***Clorox P/N 44600-01601***

. . . . . 7930-01-356-9205
360ml bottles . . . . . Buy on Demand
Bx (contains 12 bottles) . . . . . See page 5.

**Figure 4.** General Services Administration Catalog Sample. [Ref. 10.]

However, the GSA Supply Catalog is primarily a source for NSN coded material, Unit of Issue information, and current contract prices. Ordering of material is still limited to current Federal Standard Requisitioning and Issue Procedures (FEDSTRIP) or the comparable DoD Military Standard Requisitioning and Issue Procedures (MILSTRIP). This means either hand-generated paper requisitions or computerized DAAS (Defense Automated Addressing System) transmittal of standard, 80 column MILSTRIP data. Procurement of commercially avail-

able "Open Purchase" material is still limited primarily to manual requisitioning procedures, regardless of where the material is obtained, that is, either a SERVMART/HAZMART-type selfservice facility or through the local Contracting Office.

No matter how slick the format, the GSA catalog isn't too far removed from the first Sears & Roebuck catalog of the last century. Clearly, this technology has passed it's zenith.

Existing Electronic Catalog systems that tie in either via dedicated computer link or telephone modem to the customer suffer from another serious drawback that particularly restricts their use within the DoD, they're biased. They support only the products and services of the company supplying the software or modem link.

## B. SYSTEM DEVELOPMENT AND OVERVIEW

The User/Buyer Electronic Catalog (U/B ELCAT) — CONNECTSUS® — is a concept which has been taken beyond the drawing board by 3M, GE, and Thomas Publishing. Specifically designed to assist a customer in locating a desired item and identifying those suppliers who can furnish the product, it does so in a non-prejudicial format. By providing supplier access to all companies listed in the Thomas Register, over 150,000, CONNECTSUS® meets government antibias requirements for participation in the Electronic Commerce Market. [Ref. 13]

The need for such a catalog has been recognized for years and numerous companies and institutions of higher learning

have expressed interest in joint research and development with the Federal Government. These ventures are discussed further in Chapter IV. However the wheels of progress often turn quite slowly where the government is concerned, and very few of these initiatives ever developed past the initial discussion stage.

In the commercial arena, market forces that compel innovation based on profitability and shifting market share have mandated that progress continues as technology progresses. First brought together by the UCC to investigate new commercial uses for the UPC, major manufacturers set out to develop an EDI application that was focused on exploiting the benefits of the standardized bar code represented by the UPC.

The scope of such a project is beyond the core competencies of any one corporation, especially in light of the dynamics entailed in providing a timely, accurate, and unbiased electronic catalog. The potential for millions of products, tens of thousands of suppliers, and reams of U.S. Government contracting, procurement, and item specification requirements is a daunting prospect. In partnership with General Electric Information Systems (GEIS) and Electronic Purchasing Information Company (EPIC), a subsidiary of Thomas Publishing, publisher of the Thomas Register (recognized as the industry leader in providing supplier information to the procurement community), 3M decided to take the project on. [Ref. 14]

Each of these companies has contributed a particular

expertise to the joint endeavor:

* 3M - the knowledge of Government policies, practices, procedures, requirements/plans for Electronic Commerce, the Federal Supply Classification System, and Electronic Catalog design specifications.
* EPIC - the recognition achieved from the Thomas Register, the Thomas Commercial Classification System (the de facto Industry Standard), and the development and enhancement of the automated product catalog.
* GEIS - the Global EDI VAN (Value Added Network) infrastructure, transaction management and security expertise.

3M is no novice when it comes to dealing with the Federal Government nor is the U/B ELCAT the first innovative procurement system it has developed. The foundation for 3M's EC entries come from existing supply contracts with the government. 3M has more Schedule Supply Contracts than any other single vendor and their GSA International Supply Contract is the single largest in terms of the number of line items offered. [Ref. 14] 3M also pioneered the first and only global supply contract with DLA POPS (Paperless Order Placement System), which allows for electronic order entry and FOB (Free On Board) destination delivery. The contract also requires a global warranty and that technical service be

provided worldwide, as required by the customer.

CONNECTSUS® is a simplified way for a customer to attain the benefits of Global POPS from any number of suppliers. The final customer and the government buyer (Pierside Procurement, Fleet and Industrial Support Center [FISC] contracting, etc.) have the capability to conduct "Desktop Comparative Shopping" and "Push Button Order Entry."

The CONNECTSUS® system is already successfully in place within commercial industry. The flowchart diagramed in Figure 5 indicates how the commercial ELCAT procurement process works. From initial selection by the **Consumer**, to shipping and billing information sent via the **Supplier EC Gateway**, the system is integrated to work as a real-time information processing system. The **VAN** is the vehicle by which the data is routed to all appropriate parties. In comparison, Figure 6 diagrams how U/B ELCAT is envisioned to work within the DoD procurement system. The **End User** begins the process which flows through the same gate-way/VAN process as Figure 5. The only notable difference will be the involvement of DFAS as the paying agent instead of internal accounting. Both examples rely on maintaining valid inventory controls and an adequate hardware infrastructure. The similarities between the two systems — simplified in Figures 5 and 6 — and current DoD procurement practices, indicate that the changes required to implement U/B ELCAT are minimal.

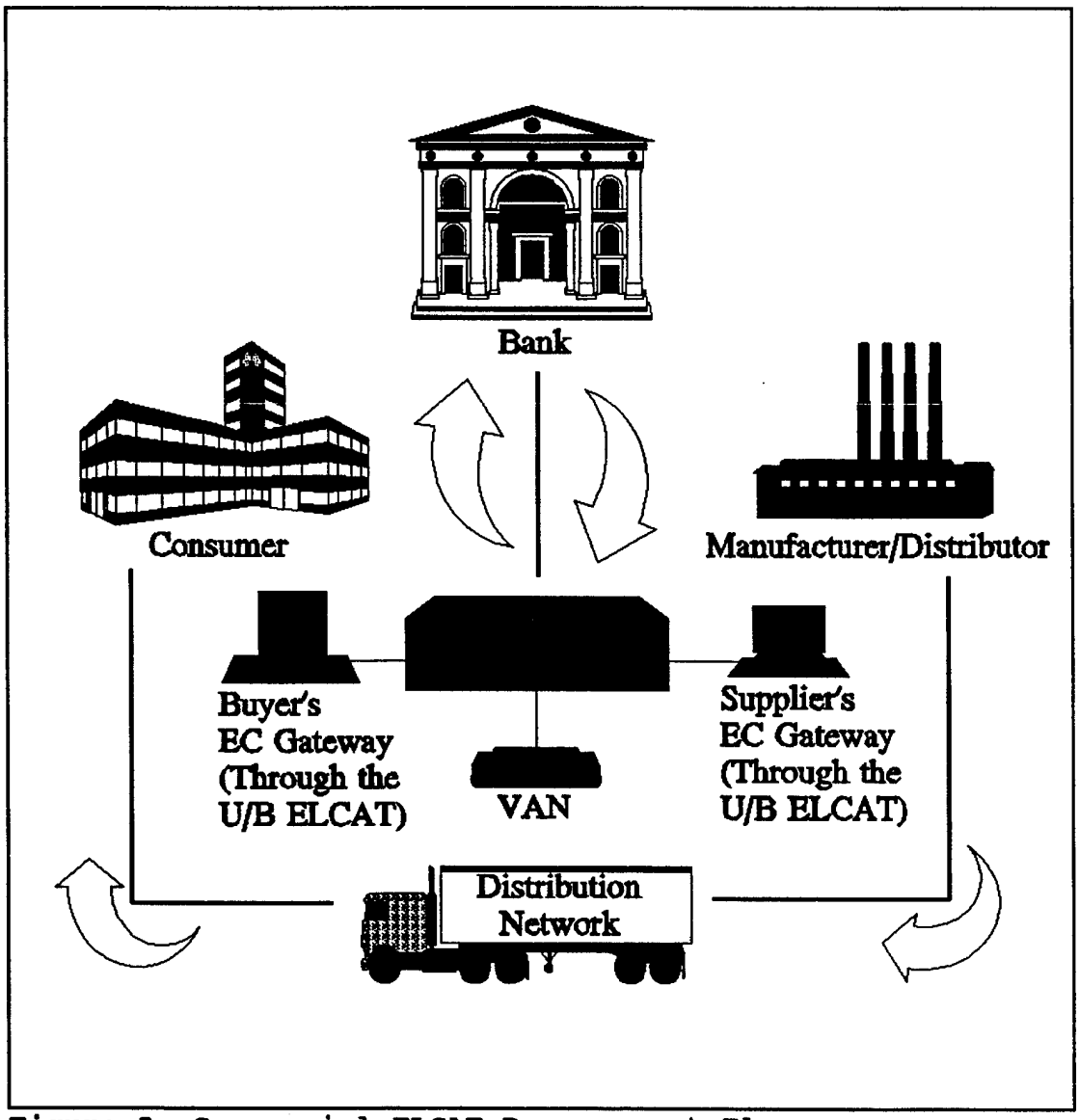


**Figure 5.** Commercial ELCAT Procurement Flow.

## C. U/B ELCAT SYSTEM FUNCTIONS

The CONNECTSUS® System supports four catalog levels/concepts for the supplier or consumer:

1. A Public Catalog that allows anyone to access and view product information. **Supplier maintained.**

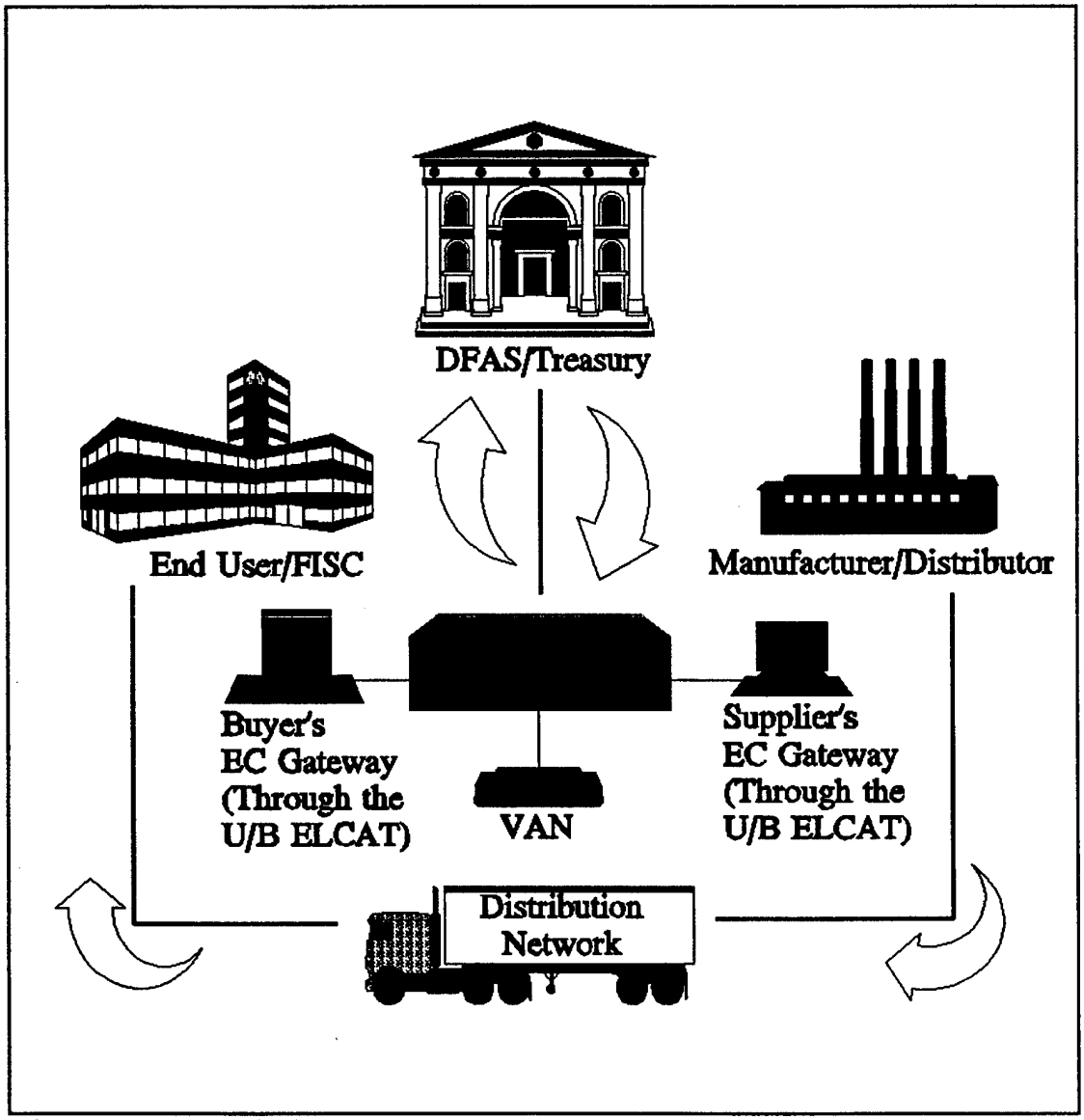


**Figure 6.** Envisioned DoD EDI Procurement Flow.

2. A Customized Catalog that contains items grouped by a supplier for a specific customer or class of customer; incorporating sensitive/confident ial information. **Supplier maintained.**
3. A Private Catalog created by a buying enterprise (from either 1 or 2 above) to support their

purchasing function. **Supplier maintained.**

4. An End User's Personal Catalog/Reorder List of their frequently procured products/services. **Consumer maintained.**

These catalogs are supported by the following automated functions:

* Host catalog application (Manages the Public and Custom Catalog facilities).
* CATALOAD; software for a supplier to be able to load products into CONNECTSUS®.
* Public, Custom, and Private Catalog search (browse, search, locate, and download of a product).
* Sourcing application (Supports a product sourcing specialist and development of a Private Enterprise Catalog.).
* Requestor application (On-line acquisition support for an End Using Activity using Personal Reorder Lists.).
* Supplier and Buyer Profiles.
* Notification and Bulletin Board (Automatic update existing products, new product announcement, and supplier announcements.).
* Audit trail and security.
* Connectivity.

Expanded information concerning the scope and specific

details of these automated functions can be found in the EPIC Users Guide. [Ref. 15]

## D. USING THE CONNECTSUS® ON-SCREEN CATALOG

Installation prerequisites for CONNECTSUS® are minimal and are probably already in place at those sites that could most benefit from this technology (Shipboard Stock Control, Pierside Procurement, Command Purchasing Departments, etc.). They are:

* 486/66 Mhz personal computer - **Optimum**
* Windows software - **Required**
* Either: Dedicated on-line; or
  1-800 dial up modem capability
* PIN (Personal Identification Number),
  part of the Trading Partner Agreement; and
* CONNECTSUS® software, available on diskette now,
  or as an on-line service in late 1996/early 1997.

Once CONNECTSUS® is installed at a site, access is controlled via the PIN mentioned above. Additionally, the PIN controls dollar/credit card limits, catalog view restrictions, ordering restrictions, and the like. Just as SUADPS-RT (Shipboard Uniform Automated Data Processing System - Real Time) controls access in the fleet and UADPS (Uniform Automated Data Processing System) does the same at many shore commands, CONNECTSUS® can be tailored around each specific individual PIN. [Ref. 16]

Given that an authorized user has correctly entered the PIN, the first screen to appear is the **Search** screen, Figure 7.[3] [Ref. 15] In the example described below, the user will be looking for a specific item given that they have only a brief description (3M Flip Chart), or the item UPC code (21200 07267).

Figure 7 provides the various categories by which a search can be made, both commercial and government. While most of the entries are self explanatory, a few may need clarification:

* SIC Code = Supplier Identification Code
* OEM Name/Number = Original Equipment Manufacturer Name/Part Number

The command "View My Reorder List Menu" is for previous users of U/B ELCAT who have customized a standard reorder list and do not need to search the database for new items.

Figure 8 is how the screen would appear if the user had selected "Noun/Noun Modifier" and entered in their known data - 3M Flip Chart. Figure 9 is the screen that will appear if one selects "Product UPC/Part #" and filled in the data fields. It should be noted that once the UPC or Part Number is entered, the other data are retrieved from the database

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[3] Figures 7 through 21 presented in this chapter are actual screen printouts from a prototype CONNECTS-US® display. A more detailed introduction to each display and menu options can be found in Reference 14.

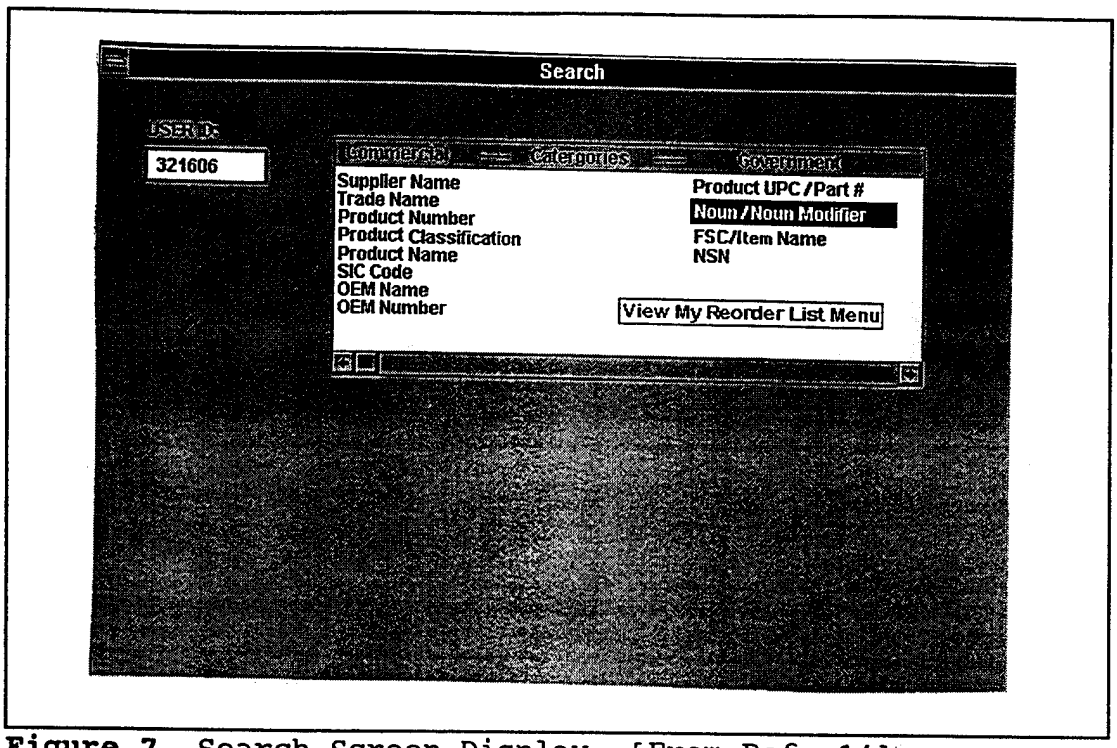


**Figure 7.** Search Screen Display. [From Ref. 14]

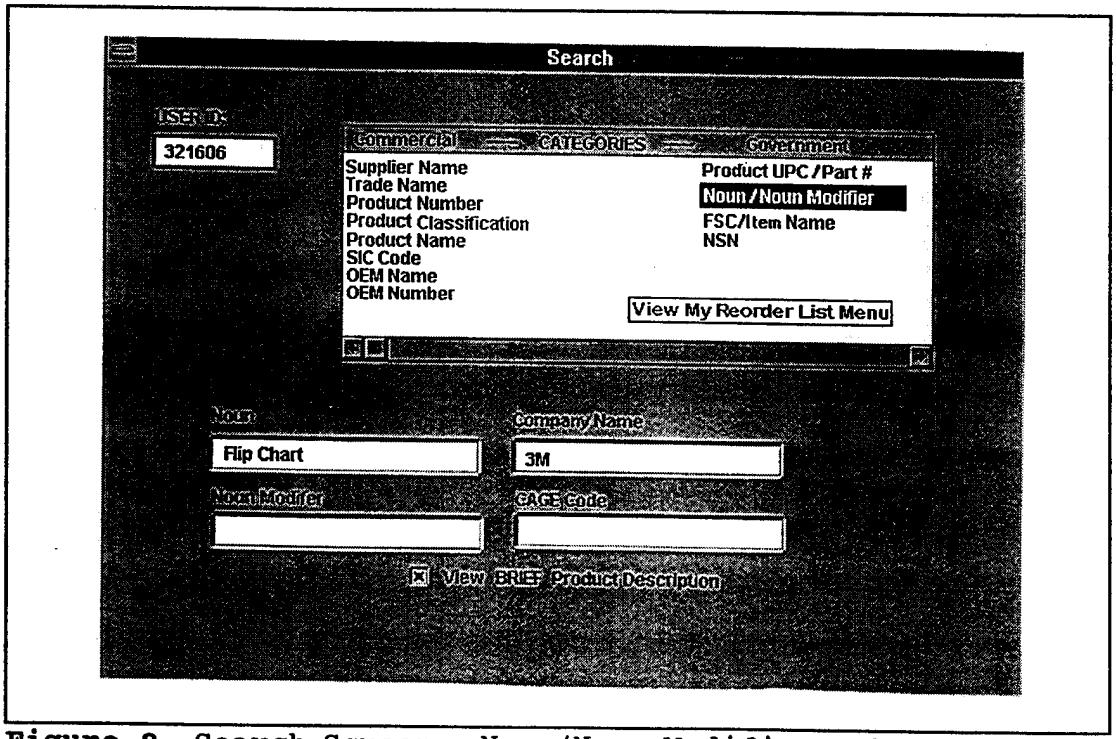


**Figure 8.** Search Screen - Noun/Noun Modifier Selected. [From Ref. 14]

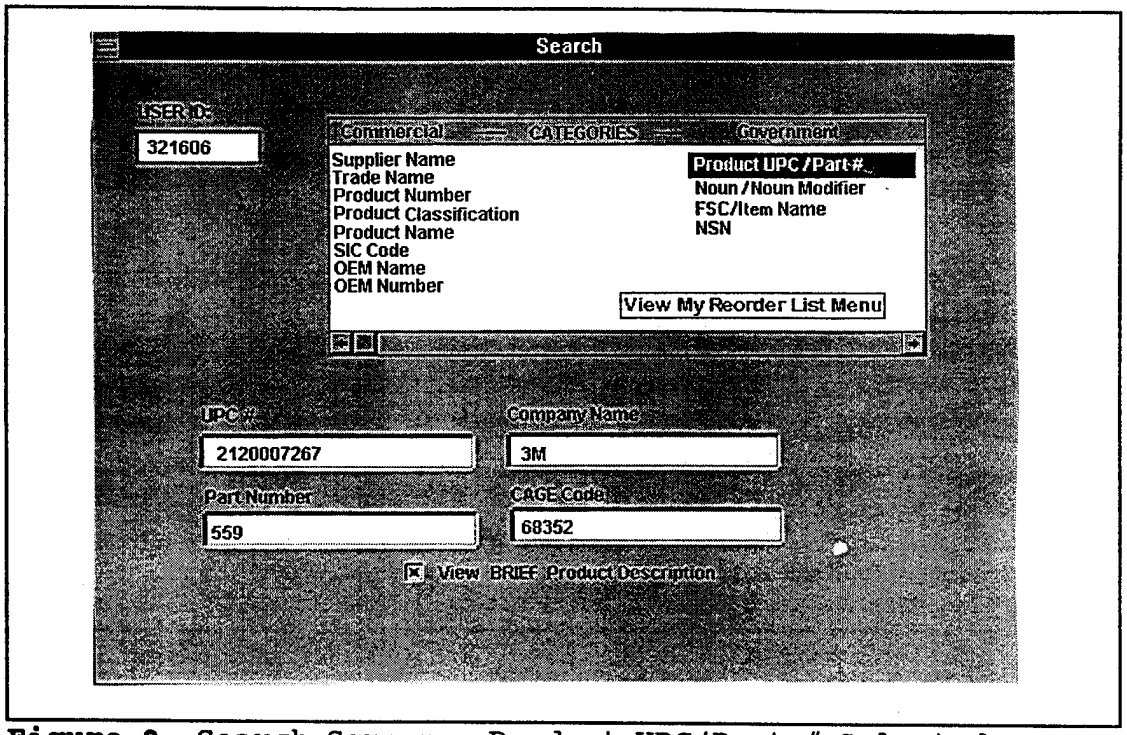


**Figure 9.** Search Screen - Product UPC/Part # Selected. [From Ref. 14]

(Company Name, CAGE Code, and either the UPC or Part Number, depending upon which piece of information entered initially).

Notice that both **SEARCH** screens, Figures 8 and 9, allow for the user to "View BRIEF Product Description." Figure 10 is an example of that BRIEF Product Description and the first screen that actually allows obligation of funds and the ordering of material. Figure 10 contains not only a product description that includes prices (both in the U.S. and outside the U.S. if applicable), unit of issue, and delivery terms, it also provides contract information and contract numbers.

Along the right-hand side of the screen, are various option commands. They are as follows:

* ENTER ORDER - If the item presented in the BRIEF

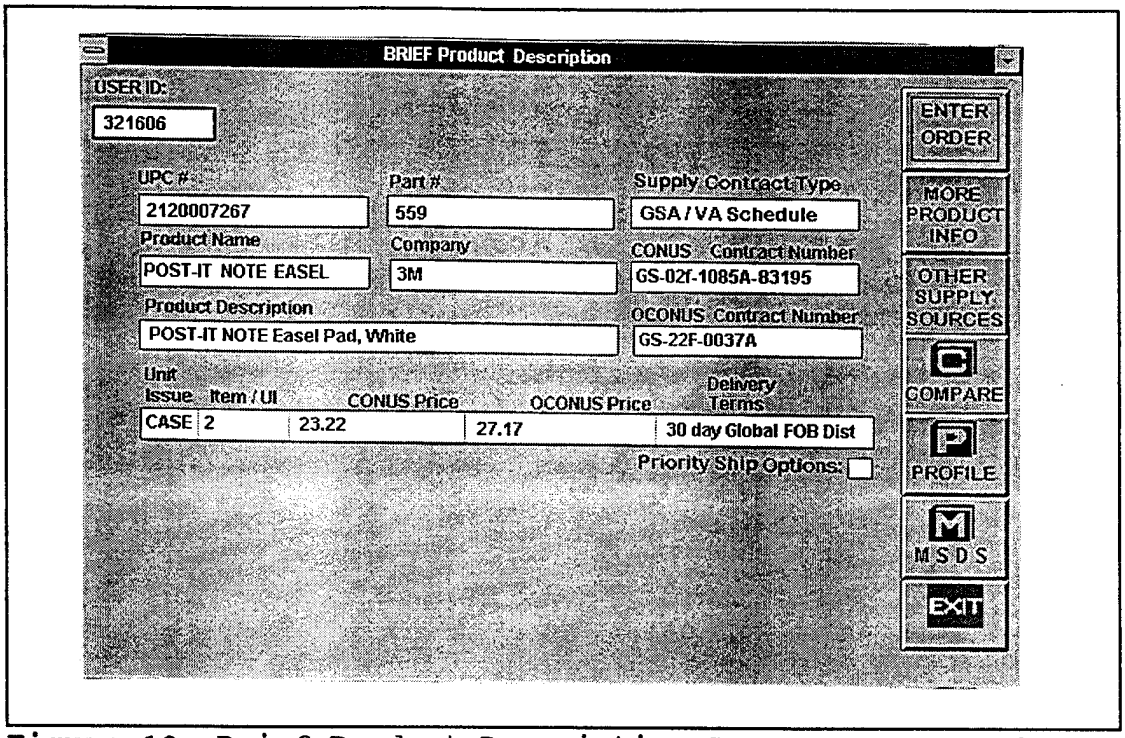


**Figure 10.** Brief Product Description Screen. [From Ref. 14]

Product Description screen is satisfactory, user presses here for further ordering instructions. See Figure 11.

* MORE PRODUCT INFO - If user require additional product information, press this button. See Figures 12 and 13.

* OTHER SUPPLY SOURCES - If user is interested in reviewing additional sources of supply for the same or like item, enter this screen. See Figure 14.

* COMPARE - If user wants to compare similar items between two or more sources of supply, select this screen. There is also

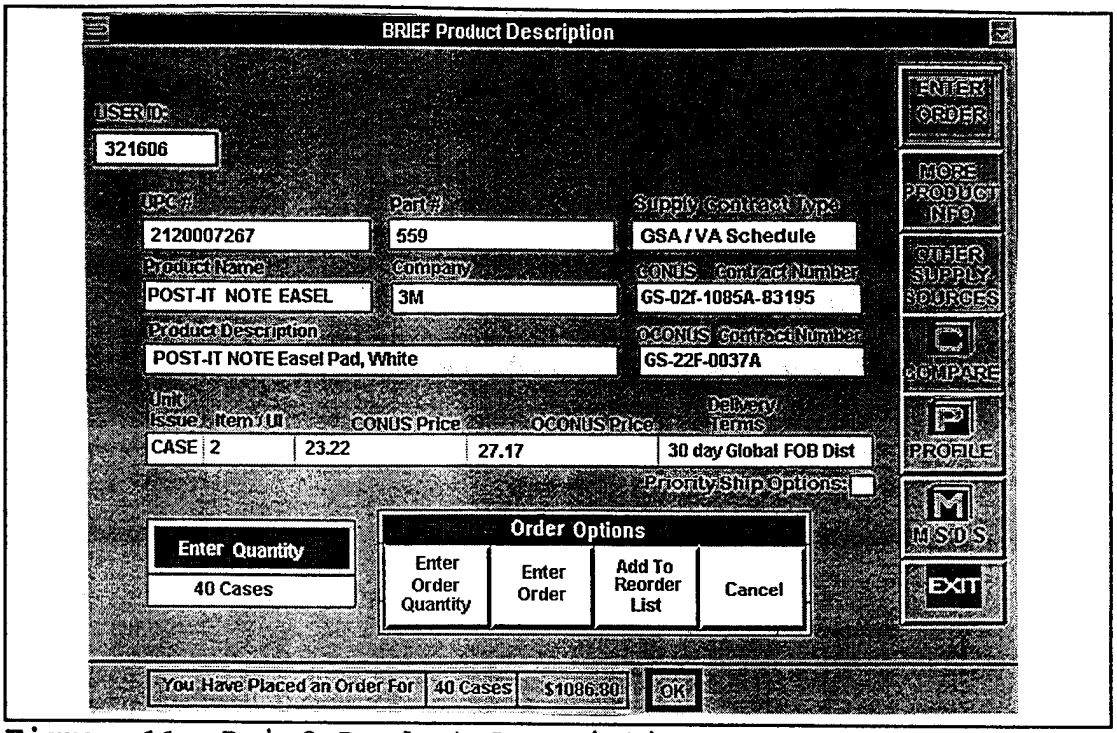


**Figure 11.** Brief Product Description - Enter Order. [From Ref. 14]

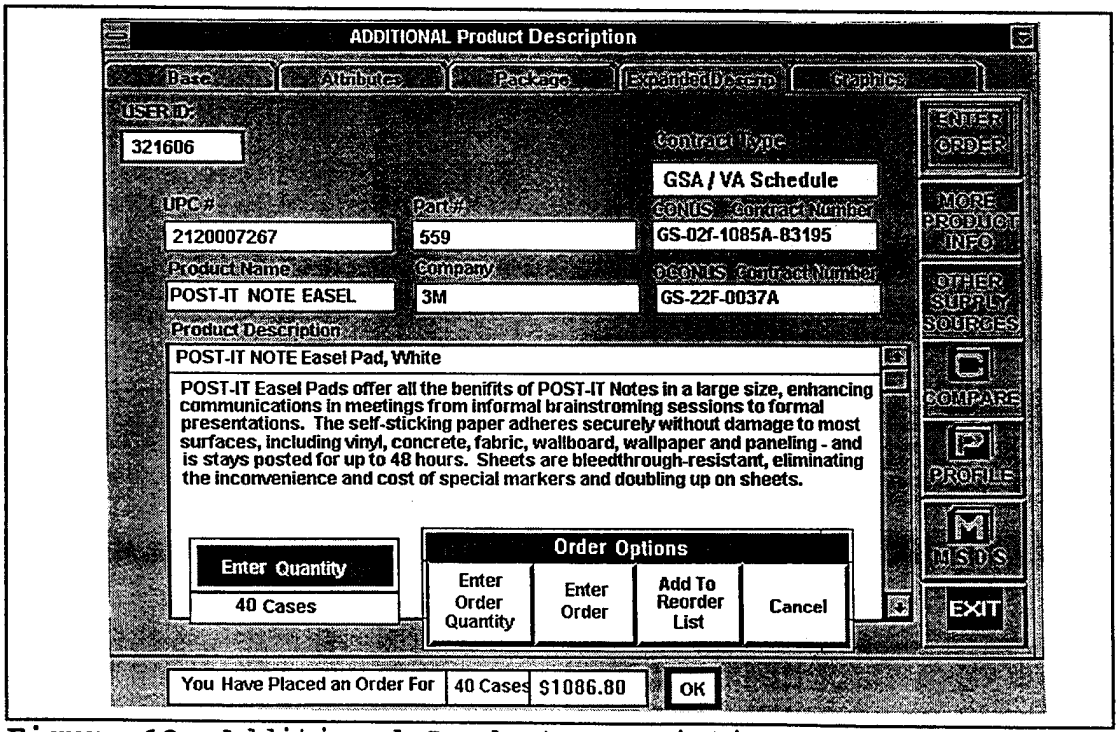


**Figure 12.** Additional Product Description. [From Ref. 14]

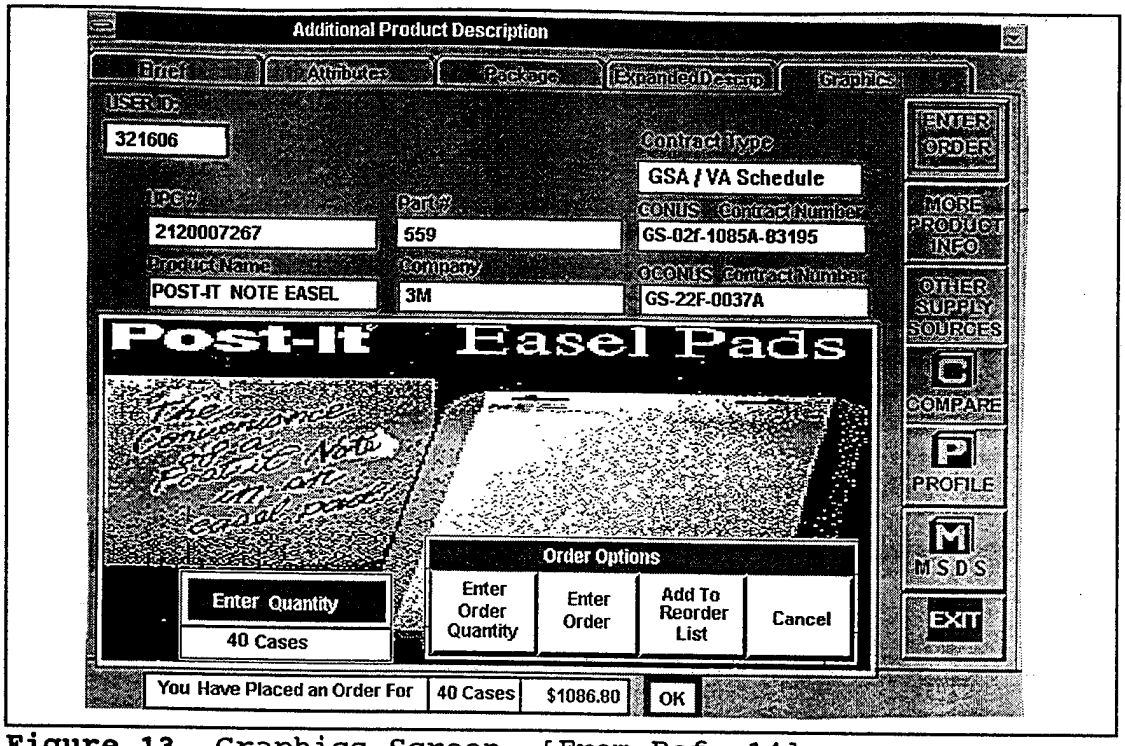


**Figure 13.** Graphics Screen. [From Ref. 14]

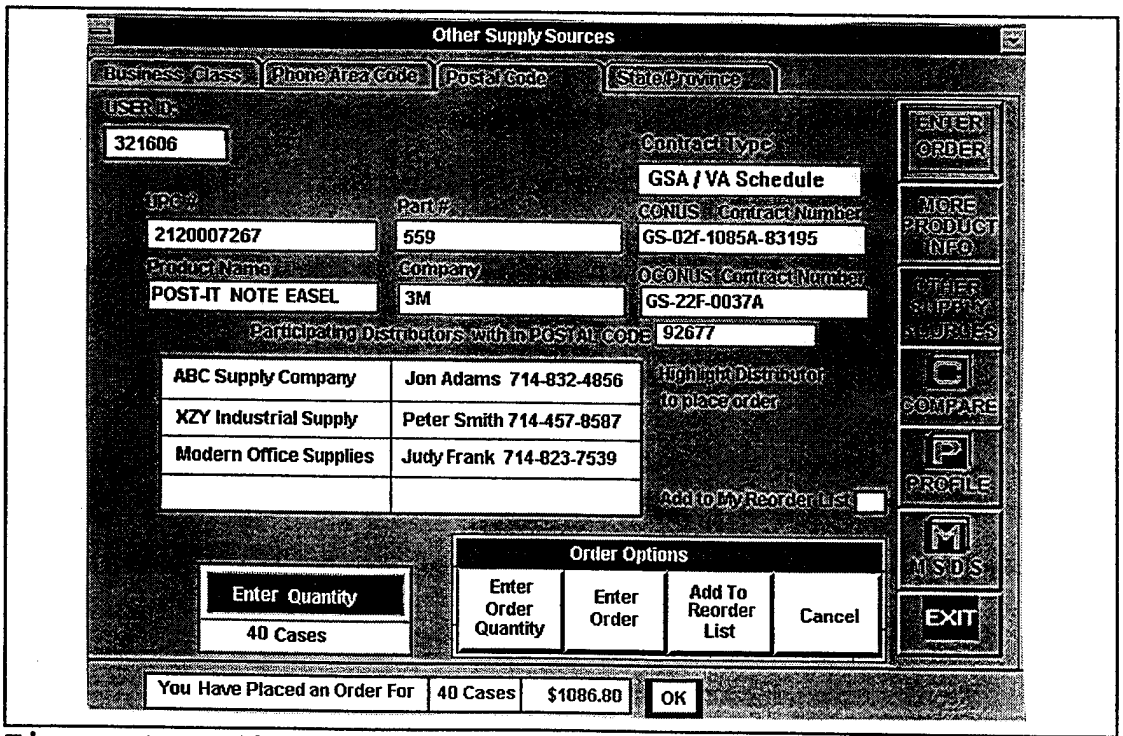


**Figure 14.** Other Supply Sources Screen. [From Ref. 14]

the option of ordering from either source from this screen. See Figure 15.

* PROFILE - By selecting this screen, the user can review profile information for the "Supplier," the "User/Buyer," as well as complete "Ship to:" and "Bill to:" information.

  See Figures 16, 17, 18, and 19.

* MSDS - If applicable to the product, this screen will allow the user to access the MSDS (Material Safety Data Sheet) for the item.

* EXIT - Self explanatory.

If the user accesses the **ENTER ORDER** screen, an **ORDER OPTIONS** menu appears across the bottom; see Figure 11. There is the option to **ENTER ORDER QUANTITY** in the **ENTER QUANTITY** field, submit that quantity via the **ENTER ORDER** command, add the item and order quantity to a personalized reorder list using the **ADD TO REORDER LIST** option, or simply **CANCEL** the order.

Before the order is submitted however, the user is given one more chance to confirm the order. The last line in Figure 11 displays the quantity of the order as well as the extended cost of the particular item ordered. The order is confirmed by entering the **OK** function. At this point, the order is transmitted to the selected Supplier (as per the contract),

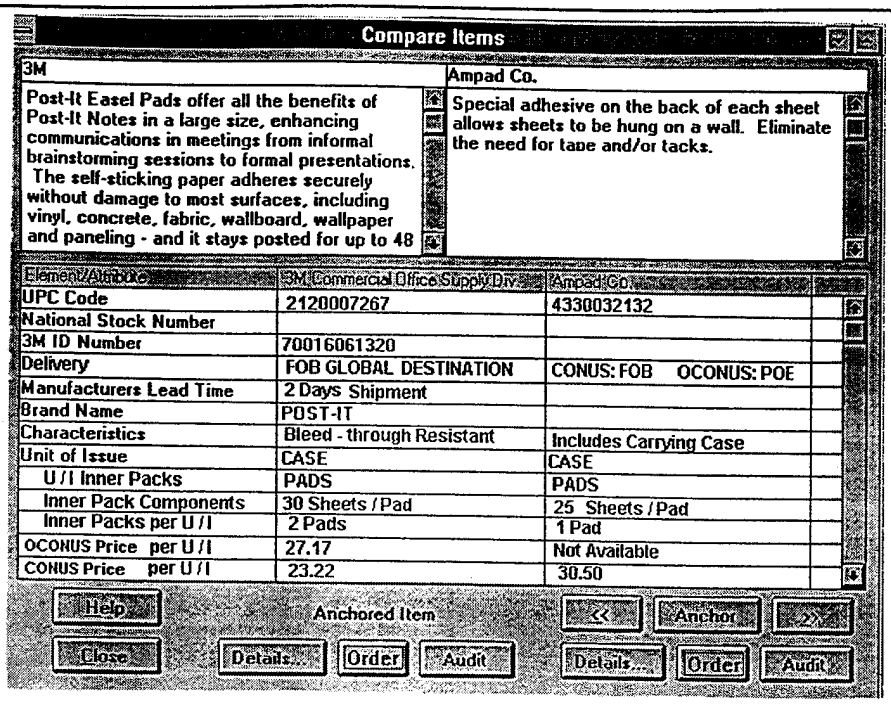


**Figure 15.** Compare Items Screen. [From Ref. 14]

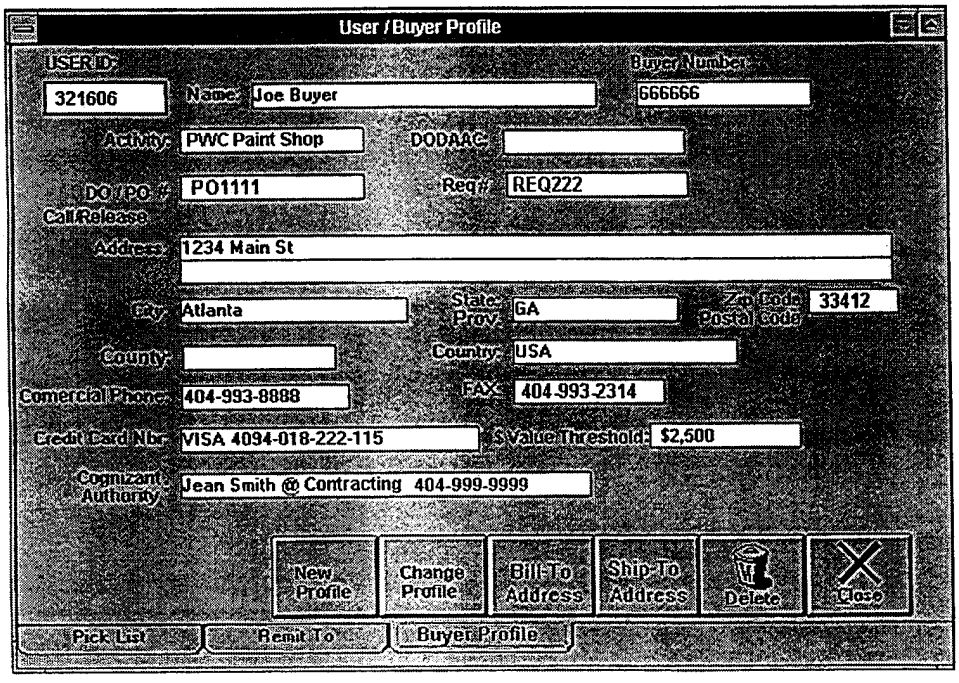


**Figure 16.** User/Buyer Profile Screen. [From Ref. 14]

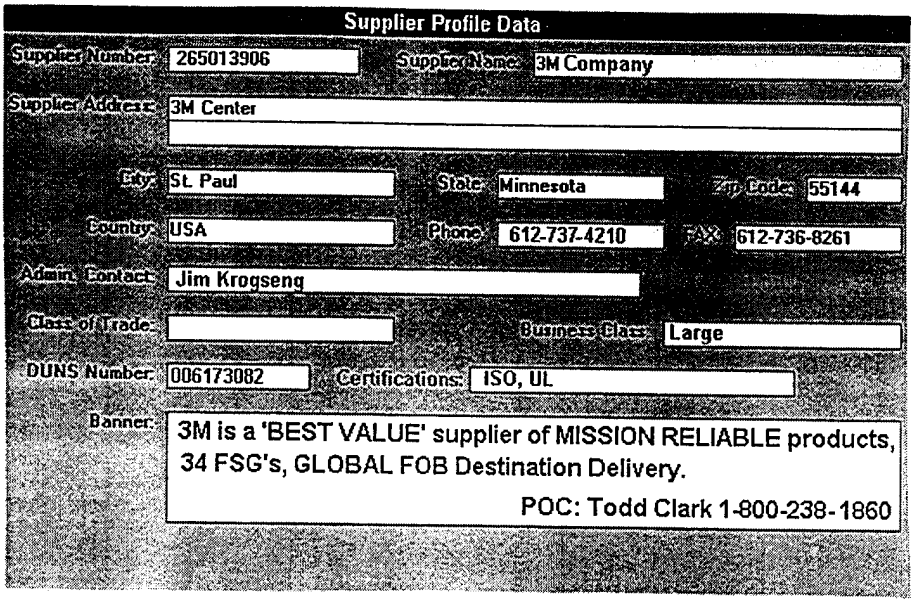


**Figure 17.** Supplier Profile Data Screen. [From Ref. 14]

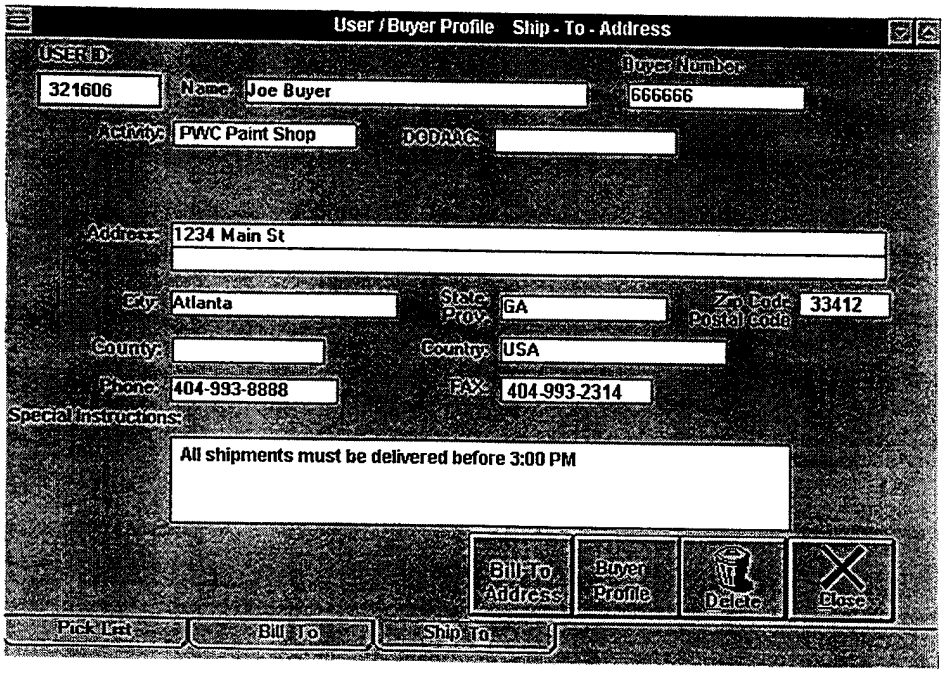


**Figure 18.** User/Buyer Profile - Ship To View. [From Ref. 14]

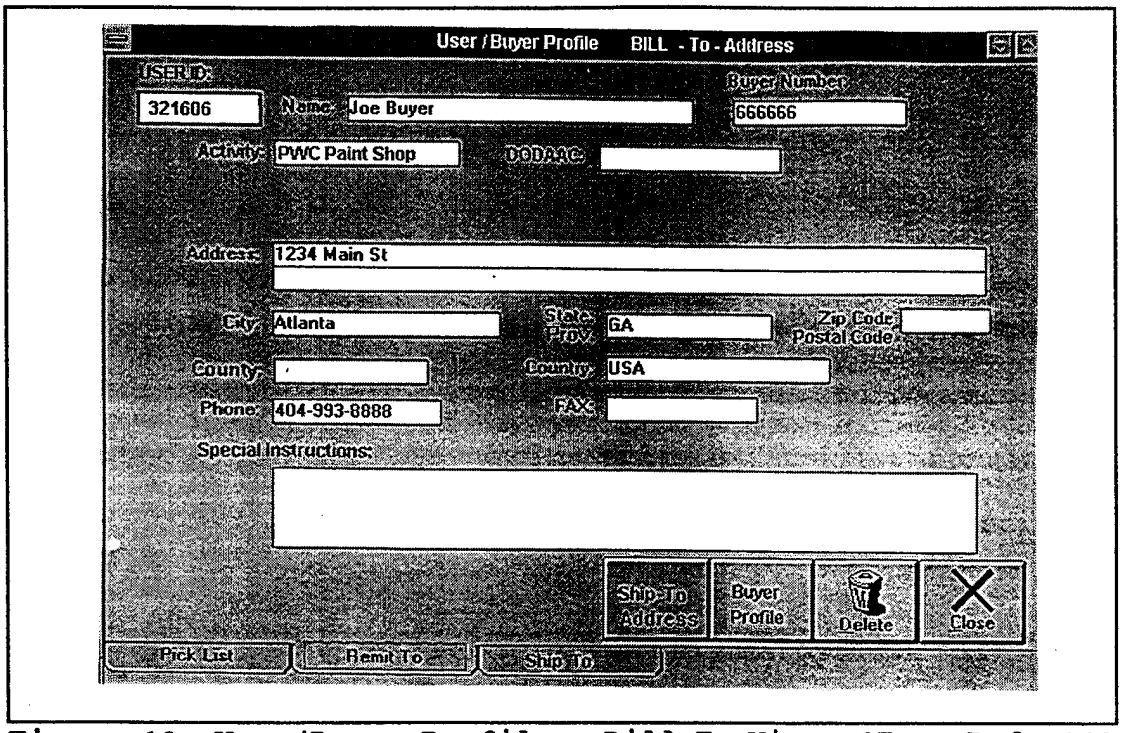


**Figure 19.** User/Buyer Profile - Bill To View. [From Ref. 14]

and additional items can be ordered.

Had the user decided to seek additional information on a given product and selected **MORE PRODUCT INFO**, the screen displayed in Figure 10 would have appeared. Note that ordering information is still on-screen, including the options to modify or cancel the order based on new information provided on this screen.

The user has the ability to access the following screens:

* Base
* Attributes
* Package
* Expanded Description (Default screen) - Figure 12.
* Graphics - Figure 13.

Within the graphics menu, if there is a photo of the product (This feature, not part of the initial CONNECTSUS® system, is expected to be added by 1997.) or a computer image, it will be displayed here. According to EPIC and 3M, additional descriptive information/documentation can be made available here. This would allow for abbreviated technical drawings, MILSPEC information, and other data applicable to the DoD.

As each screen indicates, the user has the ability to access the other screens from each new screen. If for instance, to review **OTHER SUPPLY SOURCES** for this item or an acceptable substitute, the user can enter into that screen and view the information provided in Figure 14. Participating distributors within a particular zip code will be supplied. The user can then select which distributor to place the order with, or continue to "shop around" by comparing products and prices.

CONNECTSUS® allows for comparison shopping between competitors and products. Designed to save the user time and money, this feature; shown in Figure 15, will contrast and compare any applicable item against a selected "anchored" item. For either item being perused, the viewer may scan additional information by selecting **DETAILS**, which returns to Figure 12 for the item of concern. The **AUDIT** screen provides the opportunity to keep track of products ordered, although information must be entered by the user at this stage in the

development of the system, much like SUADPS-RT exception data and Open Purchase orders are currently done in the fleet.

The **PROFILE** screen, Figures 16 through 19, gives more detailed information on the User/Buyer (Figure 16), including spending limit, in this example, $5000.00, purchase order and requisition numbers, command and Unit Identification Code (UIC), which are shown as **Name** and **Buyer Number**, as well as the approving official or **Cognizant Authority.** Similar information is provided for the Supplier being viewed (Figure 17). "Ship To" and "Bill To" information, Figures 18 and 19 respectively, include **Activity** and **DODAAC** (Department of Defense Authorized Accounting Center).

One feature that can assist in streamlining orders for activities that exhibit recurring demand is the **REORDER LIST MENU.** The example provided as Figure 20 shows some possible options for a Fleet and Industrial Supply Center (FISC) buying representative. Selecting **PWC Activity - Paint Shop,** will bring up the **CUSTOMIZED REORDER LIST**, Figure 21 for that activity.

Again, as in earlier screens, the option to review any item in an expanded format, or to view a graphic representation, etc., is provided. Along the bottom of the screen, the options to view the **Reorder List**, or look at a particular item through the **Brief**, **Attributes**, **Expanded**, **Package**, or **Graphic** screens is available. In addition, as shown in Figure 22, the user can review exception data or particular references to a

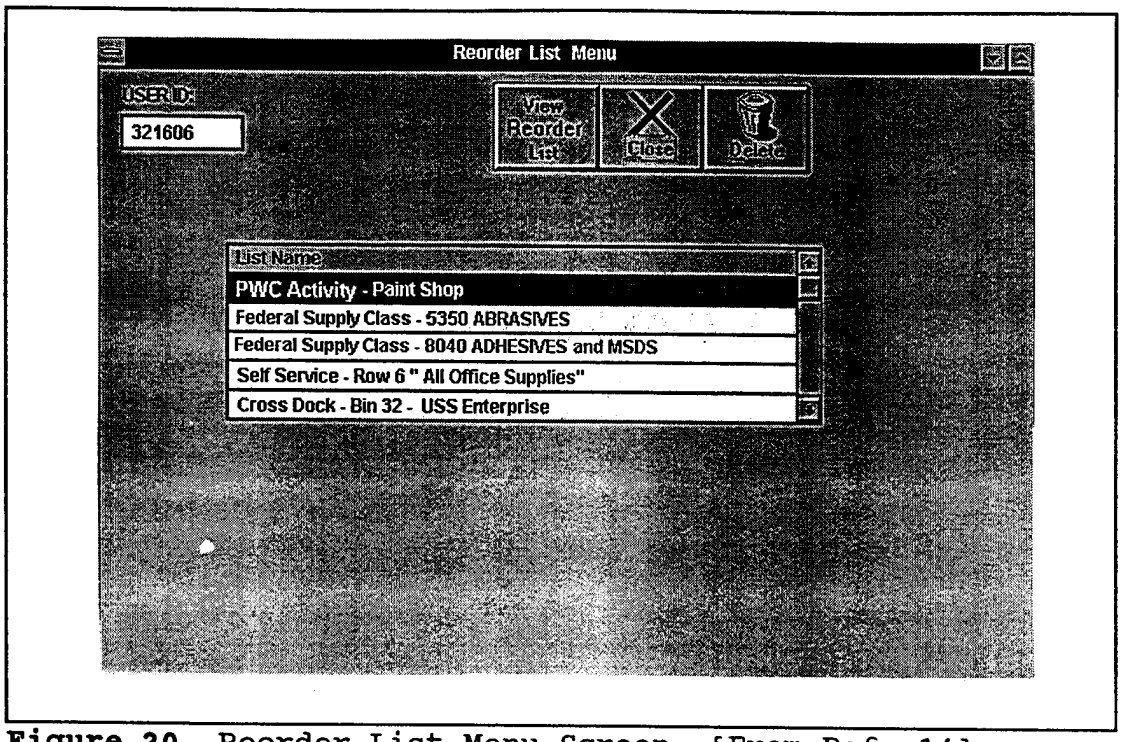


**Figure 20.** Reorder List Menu Screen. [From Ref. 14]

product by selecting **ORDER NOTES.** Reorder lists can be updated, modified, or deleted at any time. Furthermore, as information on a product changes such as price, unit of issue, items per package, etc., the CONNECTSUS® software is automatically updated when the supplier inputs the changes into the computer and transmits the data to the GEIS VAN, or when DoD procurement offices update contract information on items, prices, delivery terms, and so on.

## E. CONNECTSUS® SYSTEM REVIEW AND COMMENTS

The CONNECTSUS® User/Buyer Electronic Catalog, as demonstrated above, provides a simple tool by which the user can easily search and locate commercial "off-the-shelf"

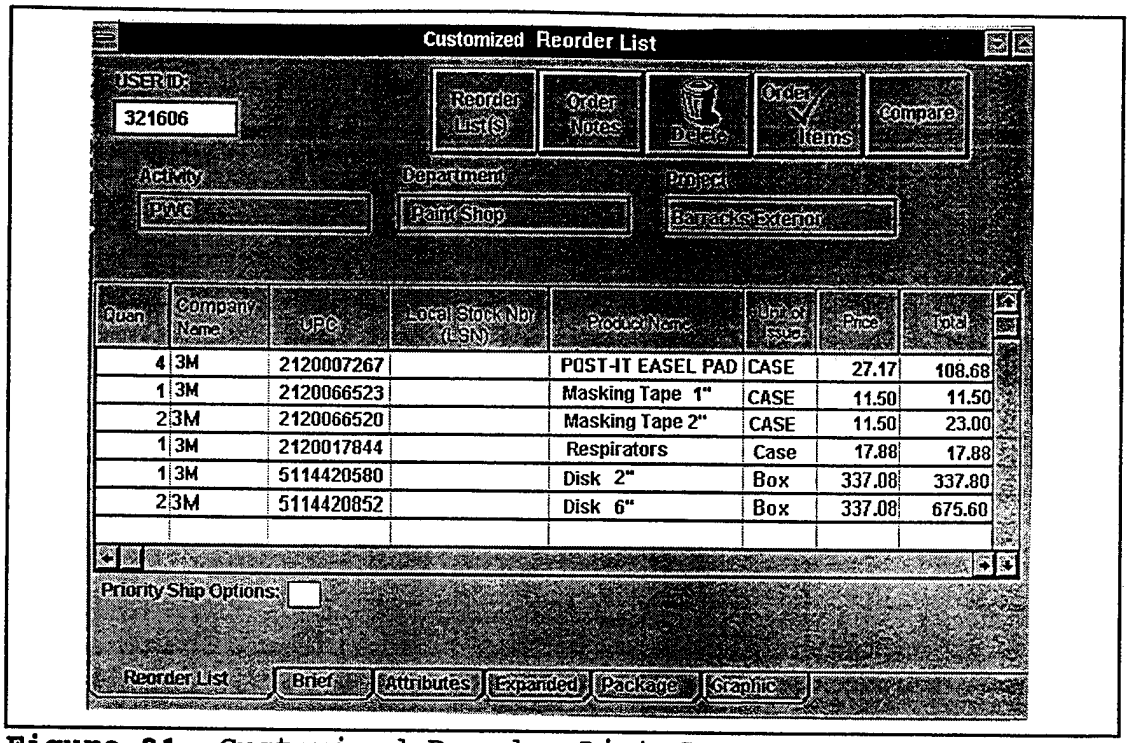


**Figure 21.** Customized Reorder List Screen. [From Ref. 14]

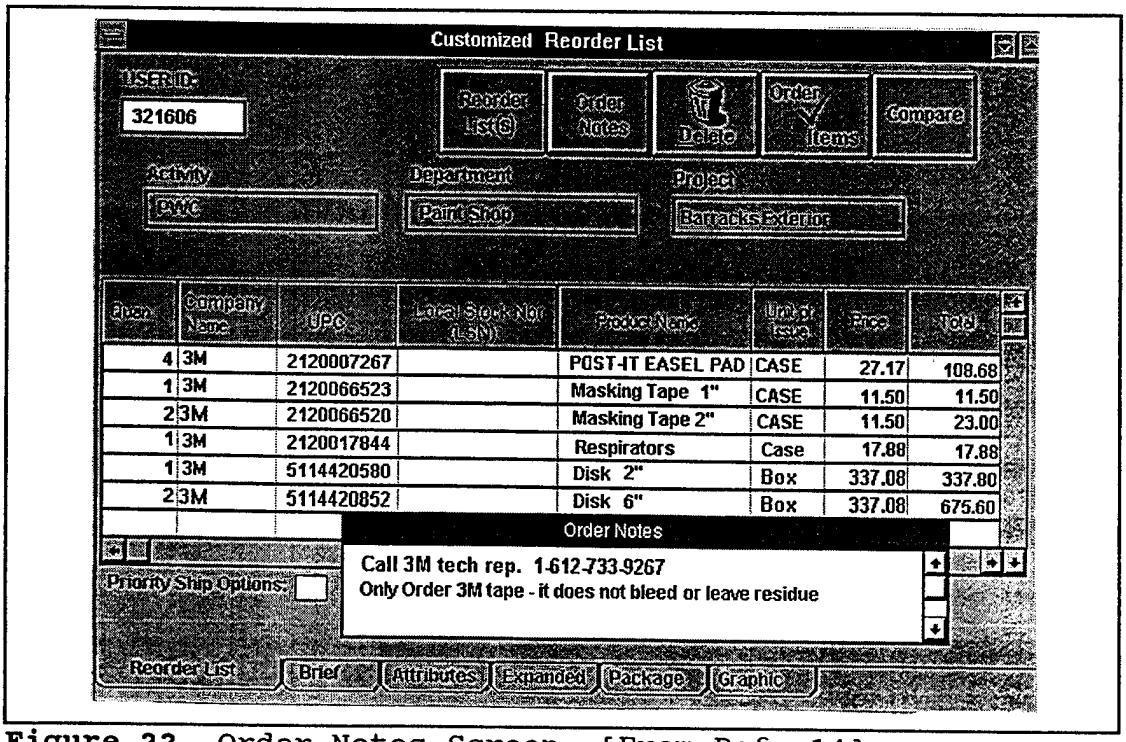


**Figure 22.** Order Notes Screen. [From Ref. 14]

products from multiple vendors. It effectively eliminates the need to do cumbersome microfiche or catalog searches, and replaces all of the following systems that are currently used to locate or identify material:

* FEDLOG/Haystack
* Source One/IHS
* Thomas Register
* Supplier List & Product Brochures
* Telephone Yellow Pages

With the continued emphasis on reducing the use of environmental pollutants by both the DoD and the DoN, the ability to access item MSDS (Material Safety Data Sheet) via CONNECTSUS®' on-line access to the Chemical Manufacturer's Association, could significantly reduce HAZWASTE costs associated with incorrectly ordered material (unauthorized chemicals, misidentified material, excessive quantities, etc.) that must subsequently be disposed of through DoD channels.

On the contracting side, CONNECTSUS®, when set up to permit charges against the government VISA I.M.P.A.C. (International Merchant Purchase Authorization Card) Credit Card or via an Electronic Purchase Order or Delivery Order (DD1155/-EDI), obligates at the current U.S. Government Contract Price, not the retail price of an item, even with purchases under the $2500.00 threshold.

These under $2,500.00 "micro-purchases," constitute the bulk of small purchases done by DoD military components,

regardless of which service is involved. Because CONNECTSUS® is designed to work with supply contracts and agreements (such as Local Blanket Purchase Agreements [BPAs], Decentralized BPAs, Scheduled Contracts [GSA] and Local Requirements Contracts [IDIQs]), Request For Quotes (RFQs) are not required. In full compliance with Federal Acquisition Regulations (FAR), CONNECTSUS® ensures fair and reasonable pricing of the goods while having no impact on FACNET (Federal Acquisition Circular Network, the government's electronic Request For Quote [RFQ] system) certification. This will be discussed in more detail in Chapter V.

In summary, CONNECTSUS® is designed to optimize acquisition management. In conjunction with the standardized commercial bar code schemata that the UCC's UPC provides, CONNECTSUS® can deliver the following to the DoD:

* Best Value Procurement
* Reduced Procurement Acquisition Lead Time
* Faster Delivery, Shorter Pipeline
* Reduced Inventories
* Reduced Acquisition Costs
* Provide Line Item Visibility

CONNECTSUS® does so by taking advantage of the DoD's ability to negotiate contracts based on their enormous buying leverage and EOQ (Economic Order Quantity) practices. Since the system is designed to work against established BPA's and Supply Schedule Contracts, it eliminates obtrusive layers of

review and authorization currently engendered in the DoD procurement chain, and an equally irritating distribution network is eliminated by direct delivery from the supplier. Finally, DoD inventories held at SERVMART/HAZMART-type operations, command supply departments, self-help stores, and the like (inventories that are costly in terms of dollars expended, space requirements, and storeroom security), can be eliminated or significantly reduced through this application of EDI technology.

Further aspects of the CONNECTSUS® system will be addressed in Chapter V, following an introduction to the competition — DLSC's E-Cat concept and DLA's PartNet program. Specific shortcomings of each system will be compared and contrasted as much as possible, given the emerging state of the technology and lack of working prototypes.

# IV. EC/EDI INITIATIVES WITHIN THE DOD

*"...[Y]ou will find a million reasons why "it won't work." The closer you get to the trenches, the more roadblocks you face. But...remember, these people are fearful of their jobs; they see EDI as a threat to their security."*

- C. Robert Kilgore
Managing Director
Railinc Corporation

## A. BACKGROUND

In early 1988, then Deputy Secretary of Defense, William H. Taft IV, issued a directive to all DoD components that tasked them with making "...maximum use of electronic data interchange for the paperless processing of all business-related transactions...." [Ref. 17] Little more than an acknowledgement of an antiquated DoD procurement system — a monstrously cumbersome and unresponsive survivor of an age before computers — the directive was followed by the usual political fanfare and establishment of "study groups" and "EDI Executive Agents" within the DoD.

Prior to this however, organizations such as the Logistics Management Institute and the Transportation Research Forum had outlined specific aspects of Electronic Data Interchange (EDI) that were eminently applicable to DoD core businesses. [Ref. 18] But these reports were hardly anything new. DoD activities have a long history of applying leading-

edge computer technology to their processes, and the use of electronically communicated business information has been a mainstay of large American commercial enterprises and certain DoD commands since the mid-1950s. [Ref. 1]

The development of standardized business practices, including the use of bar codes such as the UPC, coupled with the introduction of uniform standards for electronically interchanging business transactions across industry boundaries (ANSI X12) [Ref. 18], meant that one software package could interpret and generate standard formats for exchanging information. But true implementation and integration of EDI technology in DoD business practices — the concept of Electronic Commerce (EC)[4] as envisioned by the DoD EC Program — means more than just replacing manual operations with automated processes. It is designed "...to fundamentally alter and improve the way [DoD] carr[ies] out their day-to-day business operations." [Ref. 17]

In a Presidential Memorandum for the Heads of Executive Departments and Agencies dated October 26, 1993 [Ref. 19], President Clinton described the process by which the Federal government spends over $200 billion per year as a procedure

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[4] Electronic Commerce is the integration of electronic mail, electronic funds transfer, and similar techniques into a comprehensive, electronic-based system encompassing all DoD business functions, including procurement, payment, supply management, transportation, and base operations. [Ref. 17]

where "...the red tape and burdensome paperwork of the current procurement system increases cost, produces unnecessary delays, and reduces Federal work force productivity." By raising the level of executive attention, and with his support of the Federal Acquisition Streamlining Act (FASA) of 1994 [Ref. 20], President Clinton helped galvanize internal EC/EDI initiatives that had been started in the wake of Taft's 1988 directive.

The requirements of FASA have forced the DoD to look into further applications of EC/EDI technology that expand current uses such as were mentioned earlier. These include the procurement of grocery and retail items for the military commissary and post exchange systems. These have both benefitted from partial use and acceptance of EDI using the UPC. The application of EC/EDI to the operations of the Military Traffic Management Command (MTMC) has profoundly changed the shape of our logistics pipeline for certain shipment types, especially international surface movements, commercially moved bulk freight, and personal property shipments. [Ref. 10]

The high levels of attention that EC/EDI is receiving at all strata of the Federal government has not been wholly positive. After the Taft directive, most major agencies initiated EC/EDI programs that were specific to the functions that they were already performing. A single, consolidating point of contact, did not exist. Therefore, the directions were many

and varied in both priority and level of funding.

After the Federal Acquisition Streamlining Act of 1994 however, and with the establishment of FACNET (Federal Acquisition Computer Network), the government was required to change the acquisition process from paperwork to EDI through an electronic system designed to provide "a single face to industry and interoperability within the federal sector." [Ref. 21]

For the DoD, this requirement necessitated a single DoD point of contact for EC/EDI — the Department of Defense EC Office established by Mrs. Colleen A. Preston, Deputy Under Secretary of Defense (Acquisition Reform). Headed by Ms. Delores Smith, the DoD EC Office is responsible for coordinating and implementing EDI-based contracting systems at 244 installations within the DoD.

The task of ensuring "a single face" means that these same DoD facilities will conduct EC using EDI in accordance with established EDI standards (ANSI X12), common implementation conventions, a common communications and systems infrastructure, a common set of business practices, and commercial/government off-the-shelf software and hardware. [Ref. 22] Realizing that the commercial community is well ahead of any DoD projects in this field, a government established or designed VAN (Value Added Network) has not been part of the solution. Instead, private sector VANs will interface with one of two approved DoD Network Entry Points (NEP), either

Ogden, Utah or Columbus, Ohio.[5] Table 2 lists all currently DoD-certified VANs which provide access to FACNET.

**Table 2.** DOD-CERTIFIED VALUE ADDED NETWORKS (VANs)

1. Advanced Communications Systems
2. Advanced Logic Resources, Inc.
3. Advantis
4. ALI Corporation
5. AT & T
6. Complexity Simplified, Inc.
7. Computer Network Center (CNC)
8. DATAMATIX
9. EDS
10. ELOCO, Inc.
11. GAP Instrument Corporation
12. **GE Information Systems (GEIS)**
13. Harbinger EDI Services
14. Maple Information Services
15. MCI Telecommunication Corporation
16. Network Information Services
17. Premenos Corporation
18. Sidereal Corporation
19. Simplix
20. Softshare
21. SPRINT Government System Division
22. Sterling Software
23. Technology Management Programs, Inc.
24. TPS, Inc.
25. TranSettlements, Inc.
26. VANSAT

As a note of interest, DoD NEPs are already on-line and

[5] A Network Entry Point is a collection of hardware and software systems which provides communications connectivity between Value Added Networks (VANs) and the government gateways.

active for EDI RFQs and some large purchase orders through these same VANs. In the first three quarters of calendar year 1995, DLA NEPs had a total of 41,636 NEP RFQs and 44,288 NEP orders. While these totals include actions from every major federal department, the DoD accounted for 38,770 (93 percent) of the NEP RFQs and 42,553 (96 percent) of the NEP orders. [Ref. 23]

## B. INITIATIVES WITHIN THE DEFENSE LOGISTICS AGENCY (DLA)

The Defense Logistics Agency (DLA), in its role as the major procurer and provider of material used by the armed services, was selected by the DoD to coordinate all defense related EC/EDI efforts. A joint command by nature, DLA has become the most significant DoD logistics organization, having absorbed many of the functions once controlled by each armed service prior to the military downsizing that began during the Bush administration. Continued consolidation of procurement, inventory management, warehousing, and other related services are assured with the further implementation of both the Base Realignment And Closure (BRAC) committee decisions and the Defense Management Report Decisions (DMRDs).

In 1992, research conducted by the Logistics Management Institute concluded that more than 32 percent of all DLA procurement actions were already being conducted via EDI, either in the Paperless Order Placement System (POPS) program or under the SAMMS [Standard Automated Material Management

System] Procurement by Electronic Data Exchange (SPEDE) approach. [Ref. 18]

While neither of these programs encompass the concept of total EC/EDI as envisioned in Figure 6, they are significant first steps that have assisted other EC/EDI pilot programs find acceptance within DLA and the military services. While this thesis is limited in its ability to review the entire gamut of federally sponsored EC/EDI initiatives, suffice it to say that they are extensive.

The amount of EC/EDI information available for reference has increased significantly in the past few years. Bowing to the demand for consumer-accessible computer data base information, the federal government has sponsored extensive resource pages on the information superhighway. Appendix C lists Internet Web sites that exhaustively detail the myriad of ongoing DoD and GSA EC/EDI programs. These sites also provide an excellent source of reference material on related topics such as Presidential and Departmental EC/EDI directives and memorandum, FASA, FACNET, and so on. They are highly recommended for those interested in further discussion on government EC/EDI projects in this field.

Within DLA, two projects that hold great promise and can be likened to the 3M/GE/Thomas Publishing CONNECTSUS® system, are the Electronic Commercial Catalog (E-Cat), and the PartNet program. While the later is no longer being managed by DLSC (oversight has reverted back to DLA HQ), it is still one of

two major electric catalog initiatives that may be adopted by DLA/DLSC.

### 1. Electronic Commerical Catalog (E-CAT)

#### *a. Background*

While earlier sections have explained some of the benefits that EC/EDI will provide to the DoD, DLA (and especially DLSC) has specific problems that are not common in commercial inventory management. All items stocked by DLA must be cataloged and assigned a National Stock Number (NSN). Each time a request for support of a new item is sent to DLSC, an expensive, time-consuming search is conducted through their data base to determine whether or not the item has already been assigned an NSN. Even before DLA's aggressive effort to downsize unnecessary inventories, many of these items were commercially available and had only been assigned a stock number for material management purposes. Historically however, items assigned an NSN were stocked by DLA based on historical demand — a costly endeavor.

In response to DLA's call for commercial bids on this project, ManTech International Corporation submitted the accepted proposal. As outlined in their Implementation Plan [Ref. 24], "[t]he envisioned E-CAT will place commercially available commodity items into an electronically accessed/ maintained catalog. This catalog will not be organized by NSN. Instead the catalog will be organized by vendor and/or

commodity type/description and will be accessed and cross indexed by numerous criteria including item type, item description, vendor, part number, NSN, alphabetical index, etc." As is already available in both the CONNECTSUS® and PartNet systems, E-Cat will include the ability to process requisitions from the end-user directly to the vendor or the local supply center, whichever applies, and includes direct delivery procedures.

*b. The E-Cat Concept*

E-Cat will be vendor maintained, taking advantage of the power and availability of private sector VANs. Containing stock numbered material as well as non-NSN items, it will provide the customer with the ability to locate material, compare between vendors and government held stock, and then select and order the desired item based on any of the following criteria:

* Type of Item
* Item Description
* Availability
* Price
* Any data contained in the Federal Logistics Information System (FLIS), such as: NSN, National Item Identification Number (NIIN), Permanent System Control Number (PSCN), or Contractor And Government Entity (CAGE) Code, etc.

Figure 23 illustrates the ManTech concept of operations for the E-Cat system.

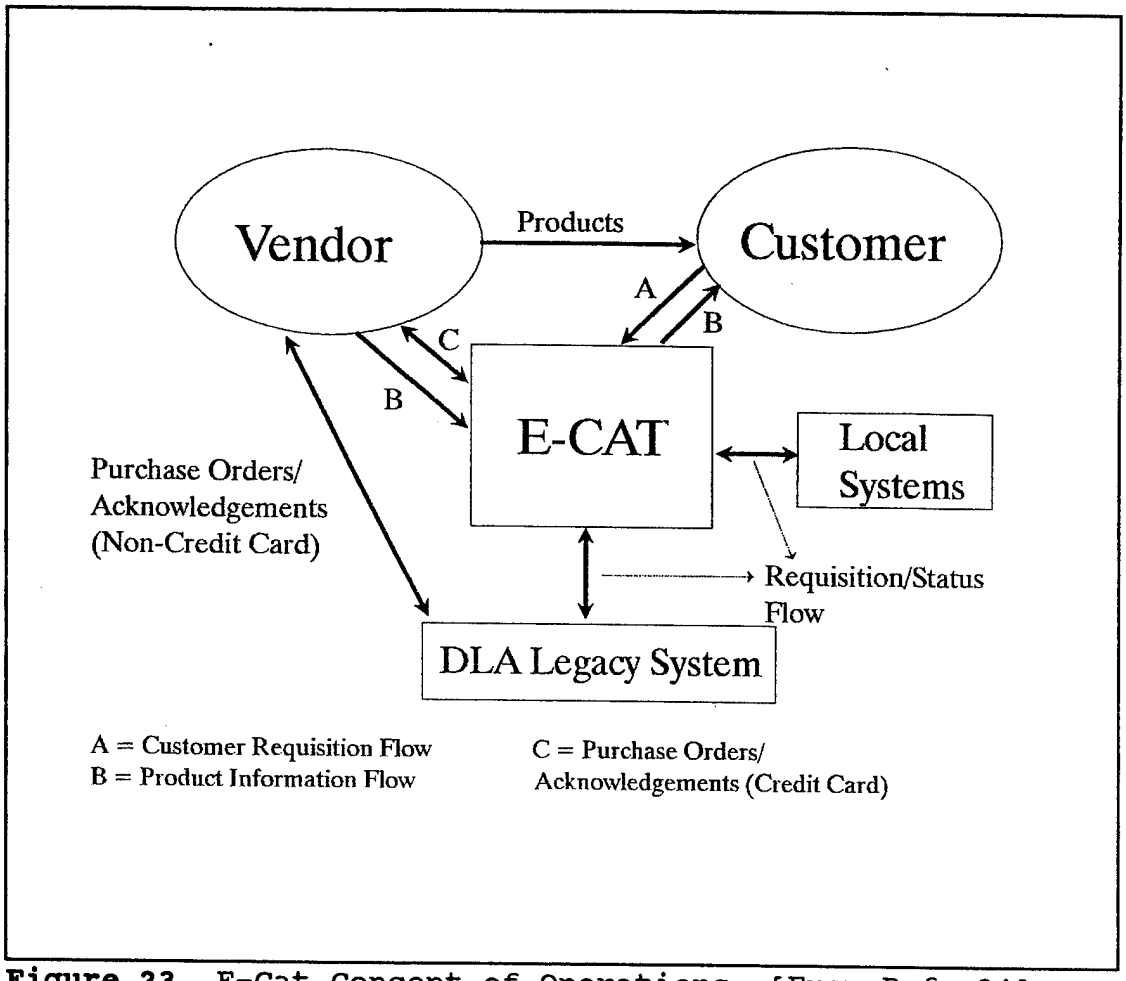


**Figure 23.** E-Cat Concept of Operations. [From Ref. 24]

(1) Customer access. The E-Cat system is being designed with the military and command purchasing agent or clerk in mind, but it will also apply to Inventory Control Point (ICP) buyers. As with the CONNECTSUS® system, the user will be sitting at a desktop PC, log in to the system, browse the catalog, create their orders, and transmit directly to vendors or DLA supply centers. The system will also provide

for status checks on orders as well as order cancellations.

(2) Vendor operations. Vendors — who maintain the system — will advertise their products through E-Cat. They are responsible for maintaining accurate data, receiving and acknowledging requisitions, and supplying order status.

*c. The Vision*

Because items that are not carried in the DLA supply system will be held as inventories by the vendor — who will also handle shipping for their merchandise — the government is freed from these costs. Additionally, DLA hopes that commercially available items that are currently assigned an NSN, managed and stocked at government expense, will be eliminated from the federal catalog as stock is depleted and the item is then procured on a demand-basis from vendors.

Most ambitious however, DLA hopes to use the leverage of their national buying power to lower commodity prices in a way that local or regional purchasing agents might not be able to, and ultimately become the primary source for items that are now obtained through local purchase actions — negating the need for the majority of purchasing offices now used within the DoD.

**2. PartNet**

The PartNet initiative is designed to work as a decentralized data base approach to electronic shopping. A pilot project managed from DLA Headquarters, it includes a coopera-

tive venture with the University of Utah, the CommerceNet consortium (Industry, academia, and Silicon Valley research houses; including Stanford University and Lawrence Livermore Laboratories), and the FAST procurement system.[6] As envisioned, the PartNet system will allow a customer to describe the item they are interested in, and via an Internet-style search vehicle, the PartNet software will explore participating vendor and government data bases seeking matches (The pilot program will provide an on-line catalog from DCSC [Defense Construction and Supply Center] and DESC [Defense Electrical Supply Center] record files.). The results, if any, are returned to the customer with the option to initiate the purchase. This is however, a far cry from the capabilities of either DLSC's envisioned E-Cat project or what is already available through CONNECTSUS®.

Advertised as "the distributed component information system," [Ref. 25] it features items such as electrical parts, components and products, test instruments, lab equipment, and machined parts (spur and worm gears, flanges, bore reducers, etc.), from a handful of vendors.

While this system is available on-line, it is extremely limited in both its list of participating vendors (7), and its

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[6] Sponsored by the DoD's Advanced Research Projects Agency, FAST has been developed by the University of Southern California's Information Sciences Institute and is based on the use of electronic mail (e-mail) for purchasing via computers.

search capabilities. Very much a developmental project, PartNet — if adapted on the FAST Electronic Broker system — will probably be too limited to be of much benefit for DoD purposes. Additional information concerning FAST and limited details on PartNet can be found at the Web sites listed in Appendix C.

DLSC is also participating in assisting the PartNet effort by providing the item characteristics search through FLIS (Federal Logistics Information System). They also plan to provide the user interface system in the future and eventually operate the main PartNet server as well.

While the PartNet system is currently operating through its Internet Web site, it offers no significant advantages over any existing procurement system — whether automated or not — due to lack of vendor participation and the need to provide an auditable paper-trail to the PartNet consortium. [Ref. 25] Unlike the E-Cat project proposed by ManTech and actively sponsored by DLSC, PartNet does not automatically bill customers. Therefore its entry into the EDI arena is not based on Electronic Commerce as much as in providing a searchable database for customer review. Additionally, this initiative is more geared towards mechanical design engineers, component engineers, and others with a detailed knowledge of Computer Aided Design (CAD) and who require a more technical approach to component purchasing. Therefore, in the context of a Program Manager or Item Manager for certain equipments,

this system has the potential to provide another searchable data base for their requirements.

## C. SUMMARY AND REVIEW OF DLA/DLSC INITIATIVES

Unlike most other EC/EDI initiatives within both DoD and GSA, the DLA/DLSC programs are some of the first to look at applications of this technology on an end-user level. E-Cat in particular has significant implications for fleet and unit level logistics.

Though neither of these systems is designed to replace current repair part procurement for material assigned an Allowance Parts List (APL) and found in logistics/engineering manuals such as the Consolidated Shipboard Allowance List (COSAL) and the Aviation Consolidated Allowance List (AVCAL), their possible impact on all levels of inventory management and maintenance cannot be overlooked. As an example, lessons learned from automated purchases and distribution networks designed around general-use consumable items may well be applied to contractor furnished repair parts for Material Handling Equipment (MHE) and base vehicles, vendor-supported diesel and electric engines and motors, shipyard contracts, non-military supported portable radar equipment, and other contractor-supported apparatus.

There is a huge market that can easily benefit from EC/EDI now. DLA alone accounted for more than $11 billion in annual sales in fiscal year 1995, managed $106 billion in

inventory and accounted for 86 percent of all consumable material used by the armed forces. [Ref. 26]

Included in these figures is the "DLA opportunity." DLA and DLSC have estimated that more than $1 billion of their annual sales are commercially available items. Another $1.6 billion is spent on commercial sales using the government I.M.P.A.C. credit cards, of which the military accounted for $795 million. Finally, base contracting (in the ≤ $25,000 category) procured $6.9 billion in goods from the open market. [Ref. 26]. These sales, which exceeded of $8.5 billion from the open market and another $1 billion from DLA managed and stocked material, if done through EC/EDI, promise significant savings in time, money, man-hours, and inventory. This is especially true when one couples this with a reduction in the need for DLA to manage most of their $1 billion in sales — and with the potential cost-benefit savings diagramed in Figure 2.

The enormous dollar values involved, and the cost of investment in any EC/EDI program, demand that all avenues be reviewed before the DoD embraces any EC/EDI technology. As has happened in the past, our large bureaucracies have fought turf wars over pet projects, with often disastrous or less-than-ideal results for the fleet and field units. Or, in our enthusiasm to assist, we jump on the first band-wagon that comes along, buying into a system that has limited potential for growth and locks the armed services into antiquated practices.

With a view towards the near-term future applicability of EC/EDI technologies to the military, comparison of both DLA/DLSC electronic cataloging initiatives (PartNet and E-Cat) to the CONNECTSUS® program is presented in Chapter V.

# V. ANALYSIS OF ELECTRONIC CATALOGS FOR DOD USE

*"...[T]he only plans worthwhile are those made well in advance and put to practical test in everyday use. In other words, to live logistics rather than merely dreaming it."*
- RADM Sam McGowan, SC, USN
1916

## A. INTRODUCTION

The purpose of this thesis has been to introduce and review current leading-edge technologies as they apply to electronic catalogs, analyze their potential impact on DoD operations and processes, and to determine whether they have the capability to significantly and strategically change how the military conducts their day-to-day business. As a background theme, we've looked at the advantages of standardized bar coding of material applicable and essential to these electronic cataloging initiatives and whether or not the military is on the threshold of an actual revolution in business practices. With the energetic increases in technology and our ability to manipulate it, can the DoD sustain the types of rapid change that adapting to (and adoption of) commercial business practices entails? And can it afford not to?

This analysis focuses on the pros and cons of the CONNECTSUS® system as compared to PartNet and E-Cat, and whether or not CONNECTSUS® has the capability to provide the

quality and quantity of information — in an easily accessible and digestible format — required for effective managerial decision making while affording significant cost savings.

The technology represented by all three electronic cataloging systems is progressing at such a rapid rate that future applications can only be guessed at. This thesis recognizes that a fully-operational cataloging system that provides access to commercially available — and armed services required — material, and which allows for complete Electronic Commerce (EC) of the business transaction is not yet fully in place or operational. Nonetheless, the prototype CONNECTSUS® system is currently operating at selected military sites overseas and will undergo its first stateside test at Warner Robbins Air Force Base, Georgia in March 1996. Once the pilot phase is complete, these prototype sites will allow for a suitable analysis of how the system is operating using UPC schemata as the primary source data.

## B. THE COST OF QUALITY

### 1. Background

Because government agencies have not usually been subject to the same costing requirements and pressures that private corporations face, accounting procedures of the two diverge considerably. Until recently, the concepts of Activity Based Accounting (ABC) and Cost Accounting were not applied to the

DoD. This is now changing. As the Defense budget continues to decline from the historical highs of the 1980s, end-user costs that had been subsidized (depot transportation, warehousing, picking and packaging, shipment, etc.) must now be properly charged. This has lead to much wailing and gnashing of teeth at the consumer level, those who have had the figurative and literal free ride.

Estimates of surcharges to be tacked on to requisition costs have varied for years, due in large part to the vagaries of DoD accounting practices. Even today, as major initiatives are underway to "reinvent" government in the image of successful commercial practices, these accounting procedures haunt the effort at every turn. However we can get a decent estimate of potential savings that could accrue to the DoD from applying EC/EDI technology coupled with standard (i.e., UPC) bar coding.

### 2. Identified Savings

In 1988, the Logistics Management Institute (LMI) released a study that highlighted potential savings from automating DoD business practices. [Ref. 27] While LMI reviewed multiple opportunity areas, the relevant one for this thesis was automating the DD Form 1155 (Order for Supplies and Services) through EDI. By LMI estimates, 11 million DD Form 1155s were processed in 1988. The direct cost savings per document if EDI had been applied was $3.35, a total savings to

the DoD of $37 million in that fiscal year. All Procurement/Contract Administration savings identified, many of which related to EC/EDI initiatives, totalled $84.5 million. [Ref. 27] LMI identified indirect cost savings that were equally impressive. Figure 24 presents their data.

Four years later in 1992, LMI released another study that validated their earlier findings and pointed to even higher potential savings through the application of EDI. In LMIs opinion, they "...believe that DoD could save at least $140 million per year in the cost of small-purchase items through EDI. [P]rimarily from improved competitive procedures, especially when applied to less than $2,500 solicitations... now conducted via telephone to only a few local vendors." [Ref. 28]

Since LMI skewed the figures from smaller purchasing commands to reflect maximum implementation rates of anywhere from 15 to 40 percent based on few orders and low volume, there is every reason to believe that a system such as CONNECTSUS® or the DLSC E-Cat project — as ideally envisioned — would enhance small base supply procedures to the point where a higher implementation rate could be achieved. Furthermore, no attempt at measuring manhours spent on routine small purchases was made, and it is these savings in manpower and time where smaller commands can reap the greatest benefit.

LMI did look at Economies of Scale and concluded that "[a]dditional savings are possible when DoD activities order

| SAVINGS CATEGORY | ESTIMATED ANNUAL SAVINGS (MILLIONS OF DOLLARS) |
|---|---|
| Inventory | $67 - 134 |
| Streamlined/Enhanced Operations | 50 - 100 |
| Prepayment Auditing | 15 - 30 |
| Interest Payments | 10 - 12 |
| Negotiated Discounts | 5 - 10 |
| Shipment Tracing | 5 - 15 |
| TOTAL SAVINGS: | $152 - 301 Million |

**Figure 24.** Estimated Indirect Cost Savings To The DoD Using EDI. [From Ref. 27]

directly from manufacturers or major distributors under indefinite delivery/quantity contracts." [Ref. 28] Both the DLSC E-Cat project and CONNECTSUS® are designed to automatically achieve this objective, PartNet is not.

## C. THE UNIVERSAL PRODUCT CODE REVISITED

As mentioned earlier in this thesis, EDI technology is enhanced when coupled with standard product identification numbers and so are the savings. Commercially available material is rarely packaged differently for one or two customers, major or minor. A box of Xerox® paper is the same for each customer; the Mega-warehouse outlets, a Mom & Pop stationery store, or the DoD. For a commercial business to

have to repackage their material, more often than not a costly process, there has to be an economic incentive. This "incentive" is an additional charge passed along to the consumer.

Some of the reasons why business (and the DoD with NSNs) have adopted standard product identification numbers include the following: [From Ref. 8]

* Systems require a unique product ID, and standard ID formats simplify systems
* They help avoid special labeling for customers
* They enable product labeling at the manufacturers
* Their use on all communications ensures consistency and accuracy
* They help avoid multiple conversion files
* They help reduce manual product look-ups
* They make bar code scanning practical
* They allow internal manufacturer changes without affecting external communications
* They make integrated EDI practical

The DoD designed NSNs to assist in inventory and material management and to ensure rigid quality standards. Their use on commercially available general-use consumable items and standard repair parts that have both military and civilian applications is expensive, redundant, and unnecessary. They also create another layer of bureaucracy between the DoD end-user and a commercial distributor or manufacturer that significantly costs the U.S. taxpayer, if estimates are

correct. [Ref. 8] Inventories maintained due to historical demand patterns, the time consumed to research and apply an NSN, and the cost to repackage material to suit Military Standard 129M (Marking for Shipment and Storage) are needless expenditures that add no value to the product nor do they increase military readiness.

The UPC/EAN Number, eminently adaptable to use by the DoD, has some significant advantages that enhance the EC/EDI concept when applied to commercially available material. These are: [From Ref. 29]

* Global compatibility, recognition, and use
* Already required on retail products in the U.S.
* Fixed length format simplifies system requirements
* Single format avoids special rules, characters, and exceptions
* More acceptance/use than any other bar code schemata in the retail industry

In addition, each UPC is applicable to only one marketable item from a specific company. Unlike internal part numbers, such as P/N A001, which may be used by dozens of companies for completely unrelated material, the UPC ensures a consistent product. UPC/EAN numbers can also reduce the time spent looking for a specific product that may have several different NSNs (such as hand tools), and they help eliminate the bane of every requisitioner, "suitable substitution" by an item manager or purchasing agent.

UPC/EAN schemata is not a replacement for the NSN, and should not be confused as such. Earlier DLA or Naval Supply Systems Command (NAVSUP) sponsored study groups have clouded the issue by applying broad generalizations and pointing out exceptions-to-the-rule. Instead, the NSN should be tailored to military-only equipment where they are the sole consumer. The UPC/EAN bar coding, already applied to commercially available commodities, should be considered as an acceptable format for those items purchased by the military, used in conjunction with the NSN until DoD inventories are depleted.

As it stands, fleet and field units have long used manufacturer part numbers (P/Ns) and local stock numbers (LSNs) to identify nonstandard material or items procured via Open Purchase procedures, and the UPC/EAN would present no challenge or obstacle at this level. SUADPS-RT, UADPS-RT, and NALCOMIS — to name three of the Navy's major command-level, computerized inventory management systems — can all support P/N and LSN items, and they do.

Policy making is too often so far removed from where the action is, that a natural disconnect is the usual consequence. This is due to a myriad of factors that are usually the result of well-intentioned but ultimately benign ignorance — the natural progression of seniority that removes personnel from field and fleet operations, a naively sentimental view of events past, or a simple lack of experience at the level where policy is made to happen. An idea that may look good on

paper, tossed about in an academic or major systems command setting, does not always result in the projected outcome. The variability encountered at the lowest organizational levels almost guarantees that any project or policy will be applied with the same variability. Internal environments — the people, the equipment, the quality of leadership, the command atmosphere, the level of understanding of the policy — will never be standardized across semi-autonomous commands such as those found in the military.

The result can be misapplication of the policy or program, partial implementation, complete disregard of it, or as is normally the case, a successful fulfillment. It all depends. But most successful implementations of new policy come in spite of the directive, not because of it. Military officers are trained to take the ambiguous and apply it concretely. It is this adaptability, versatility, and ingenuity, displayed by first level managers in the fleet and on the field, that allows them to overcome the problems that cause stagnation and indecision at the policy-making level — bureaucracy, fear of change, and "buck passing." In the case of applying dynamic (and often customized) commercial business practices that will either supplement (or replace) existing DoD policies and processes, resistance within government seems inevitable.

The issue then, centers on how the DoD can empower the end-user to effect policy changes — upwards — that incorporate

the end-user's experience, innovation and their needs and desires. Policy changes which may include whether or not the UPC/EAN would be, or could be substituted for the NSN, and how local procurement of general-use consumables (such as office supplies, cleaning products, galley equipment, and hazardous material containment kits) can be simplified while experiencing savings in cost and time. The answer could be achieved through use of the CONNECTSUS® User/Buyer Electronic Catalog at the base, large shore and afloat command, and local procurement office level. As Figure 9 reflects, the UPC is an integral material identification code used in the CONNECTSUS® system. As an inherent part of the SCC-14 Shipping Container Code, the UPC serves a function that even an NSN does not; it acts as a shipping code that is applicable to In-Transit Visibility (ITV) technology, another far-reaching aspect of EDI discussed in References 1, 10, and 28.

## D. SYSTEM REVIEW

Of the three reviewed systems — CONNECTSUS®, E-Cat, and PartNet — only two, CONNECTSUS® and PartNet are even operational. Since none of the systems have been fully fielded or tested by the DoD, analyzing the differences between PartNet and CONNECTSUS® is difficult. However there are some points that can be compared:

* CONNECTSUS® is a real-time, interactive system that supports two-way communication through the GEIS

VAN, whereas PartNet is more akin to a one-way Internet Web search vehicle; you type in a query, it searches its database and returns possible matches.

* CONNECTSUS® has access to more than 150,000 potential vendors through EPIC's association with the Thomas Register. Additionally, vendor participation in CONNECTSUS® does not require registration with the Thomas Register. PartNet is presently limited to 7 vendors. Queries to PartNet concerning expansion efforts and registration fees for small businesses did not generate any responses during the data collection phase of this thesis.
* CONNECTSUS® does not require Internet access, PartNet does.
* PartNet requires manual agreements and BPAs with authorizing signatures be onhand before transactions are completed. CONNECTSUS® is designed to work with vendors that are covered under existing contracts. Once the EPIC site contract is in place, additional paperwork in unnecessary.
* CONNECTSUS® was designed to facilitate doing business with the DoD, PartNet was not. DLA HQ is funding a review which assesses PartNets potential applicability to DoD processes.

When we look at differences between CONNECTSUS® and

DLSC's E-Cat, there aren't many. With either system compatible (or envisioned as capable of compatibility) with the current DoD system, identifiable differences/limitations include:

* Neither have plans to provide satellite links for deployed units (using the Streamlined Automated Logistics Transmission System [SALTS]) in the near term. While this limits the use of the system for units deployed — either at sea or in remote areas — and currently dictates that fleet/field auxillary supply units must carry an inventory of general-use consumables, it is ameliorated by the fact that ships, once in port (foreign or otherwise), should be able to access the system during those periods.
* E-Cat will still route order requests through DLA/DLSC instead of transmitting the purchase directly to the vendor. This might cause additional delays in receipt (as compared to CONNECTSUS®), however it should still be significantly faster than current procedures. As long as the intent is to screen government assets, capture demand data, and analyze procurement practices, this should not be an issue. It is when data is subject to excess scrutiny, needless tiering of approval, and used to justify DoD personnel or inventories that it becomes an issue.

* E-Cat does not ensure the same level of security for purchases. Dollar limits were not originally looked at, therefore the possibility of credit card fraud or overobligation of funds exists. This is a fairly serious oversight especially if this system is planned for deployment to fleet and field units. The potential for financial misappropriation - intentional or not — is there.
* Finally, and not to belabor the point, CONNECTSUS® satisfies almost every requirement outlined in the ManTech proposal submitted to DLSC concerning the E-Cat program. [Ref. 24] "E-Cat" is here; it's CONNECTSUS®.

## E. MEET THE FLEET - OVERSEAS PILOT IMPLEMENTATION

Beginning in October, 1995, overseas commands began receiving the CONNECTSUS® system on a trial basis. Initial reaction from these sites has been favorable. CONNECTSUS® was successfully fielded in the following overseas military sites as a pilot project:

* Yokota Air Force Base (374th Logistics Group) - JAPAN
  - Medical Logistics
  - Contracting
  - Base Supply
  - Base Maintenance
* Camp Smedley D. Butler (USMC) - OKINAWA

- Contracting
- Base Supply

* U.S. Navy Hospital - OKINAWA
  - Contracting

* Yongsan Army Base - KOREA
  - Contracting
  - 121st Medical Hospital

* Camp Carroll Army Base - KOREA
  - Medical Contracting
  - 16th Medical Logistics Command

Implementation and training was provided by 3M, GE, and Thomas Register at each installation site for the purpose of assisting each pilot program fully understand and utilize the system during the initial 90-day test program.

The last 90-day pilot program is scheduled to end in April, 1996, however each site has requested and received permission to continue evaluating the system — at no cost to the DoD — for an indefinite period. While the mechanics of the system have been favorably evaluated, two significant problems have been encountered with the current CONNECTSUS® system.

First, telephone connectivity is difficult. Most commands have not provided, or are unable to provide, a **dedicated** telephone line for the modem connection. This means that during routine office hours, the system is usually taken off-line in order to facilitate the transmission or receipt of

fax messages and to place long-distance telephone calls. Since most sites are located some distance from the nearest Value Added Network (VAN), the connection is a long distance one. To keep the system on-line at overseas telephone rates is a cost that can significantly negate any potential savings.

Secondly, Thomas Register has not been as aggressive as anticipated in providing multiple vendors. As of March, 1996, the overseas CONNECTSUS® systems have only one vendor — 3M Corporation. Each pilot location has indicated a strong desire to have more vendors available on-line and for the system to deliver the advantages discussed in Chapter III. Commercial CONUS sites are provided much more variety, it is the overseas locations that are lacking.

These problems are being worked out at each pilot site. Dedicated phone lines are a command or infrastructure issue and have nothing to do with system performance. GE is putting High Performance Nodes (HPNs) at each site in order to transform the call from a long-distance charge to a local call. Thomas Register has also been working the issue of overseas vendors for further review.

Neither of these inconveniences apply to CONUS or Hawaiian/Alaskan operations, therefore scheduled pilot programs at the following sites should not suffer these particular problems:

- Warner-Robbins AFB (Georgia)
- Tripler Army Hospital (Hawaii)

- Fort Richardson (Alaska)
- Elmendorf AFB (Alaska)

If the problem of overseas vendors is solved, then scheduled pilots at Anderson AFB and FISC (Guam), as well as Yongsan Army Base — Supply Point 51 (Korea), should not suffer these annoyances. [Ref. 30]

Finally, the ease by which material can be identified using this system has not been hindered by the fact that material data is transmitted based on the UPC instead of the NSN. Shipping and receiving functions have also not reported to 3M or EPIC any problems related to UPC/EAN or SCC-14 bar code schemata. Since requisition numbers and item description are on each shipping/packaging label, identification of the material or the appropriate customer is not an issue.

## F. THE CHALLENGE AHEAD

Chapter V has focused on some of the benefits of applying the Electronic Catalog concept for DoD use. Because the technology is so new, and in view of the fact the DoD has insufficient historical records concerning process cost accounting, a true cost/benefit analysis is impossible at the present time. As has been mentioned earlier, DoD business practices have not kept pace with the commercial world, especially their accounting practices and standards. The situation facing the DoD now is not unlike the dilemma that American automobile manufacturers faced in the early 1970s.

We have an antiquated infrastructure, are bound by archaic rules and regulations, stymied by lack of foresight and vision, and not completely cognizant of what the final consumer really wants or needs.

For anyone familiar with the intricacies of government bureacracy, C.S. Lewis's comments in the preface to *The Screwtape Letters & Screwtape Proposes a Toast* appear to have more than a modicum of truth to them. Animadversion is often an easy concept to understand and apply in such an environment. As a result, the creative thought process — the very essence of individualism — is all too often lost in the bureaucratic workplace. Until recently, one could argue that innovative and visionary thinking was neither required or desired in a bureaucrat.

Therefore, it comes as no surprise when our "critical training" enables us to point out possible reasons why further implementation of an available EC/EDI system like CONNECTSUS® should not be aggressively pursued. These include the following;

* Narrow selection of vendor profiles at overseas locations
* The impact of start-up costs on very small, local businesses [Cost data can be found in Appendix D.]
* No proven satellite transmission capability
* System training/troubleshooting capability for deployed units

* Lack of visibility of DoD owned assets
* The impact on the present requirements for civil servants in the purchasing arena

As insightful as the above list is, the greatest deterrent to a more aggressive test and evaluation of the CONNECTS-US® system by the DoD are the DLA initiatives — E-Cat and PartNet. Resources of time, money and personnel have already been expended on E-Cat and PartNet. To admit alternatives now, might be perceived as wasting those resources. Realistically though, nothing could be further from the truth and more detrimental to percipient analysis of future technologies and innovations, especially as they apply to logistics. Electronic Commerce (EC) and Electronic Data Interchange (EDI) are such novel technologies - technologies whose applications in the commercial sector are almost as embryonic as the DoDs — that each new day seems to herald another advancement. It is our own tedious bureaucratic process that handicaps the proposal, review and acceptance of an idea. This impediment forces outdated or incongruous systems on the DoD and locks up resources that might be better spent elsewhere. So DLA, like much of the federal government, is hindered not by their lack of insight, dedication or innovation, but by a system in which they are a cog.

Finally, implementation of a new system is inherently fraught with change, positive as well as negative. Being creatures of habit, people generally lament the fact that

switching to any system, including CONNECTSUS®, might be a painful learning experience. But we can also consider the fact that similar arguments were voiced at other resourceful concepts such as LAN systems on ships, Readiness Based Sparing of aviation repairable items, and DLA consolidation of cross-service material (that material that is used by more than one of the armed services).

As the current administration has been quick to point out, the DoD does not need to invent comparable systems to what the business world is using. It only needs to adapt those systems and practices to their (DoD) purposes. [Ref. 19] While CONNECTSUS® appears to offer almost every advantage envisioned by DLSC and ManTech in their proposal for the E-Cat system (and is already more capable, more accessible, and easier to use than PartNet), DLSC and DLA have shown reluctance to authorize further pilot studies of the system for the simple fact that they desire to own the operating software instead of leasing it from EPIC.

With the phenomenal leaps that technology promises every few years, the DoD has suffered numerous cases of procuring or developing certain proprietary software or hardware, only to be saddled by these same systems for decades, long after technology has rendered them obsolete. The current software and hardware that supports shipboard SUADPS-RT and shore-based DoD accounting commands are glaring examples of this and have only recently been remedied or addressed. There is no reason

to believe that current EC/EDI initiatives will display any more longevity than 8-track tapes, floppy disks, or the Beta video-tape format. And this **includes** electronic cataloging.

Just as businesses have learned, the DoD must recognize that owning is not always a better alternative than leasing. Nor should we look at every new technology as a permanent fixture. Our environment is every bit as dynamic and challenging as the competitive business world. Deputy Under Secretary of Defense for Acquisition Reform, Colleen Preston has noted, "The key today is to be the first to integrate the technology already out there. Whoever succeeds will maintain the superior force." [Ref. 31]

The potential cost savings have been outlined in any number of studies. However, not one study has recommended against applying EC/EDI technology to DoD processes. Nor have they recommended that the DoD replicate existing technologies. To this end, we have tried to look at the potential associated with CONNECTSUS®, a system not without some flaws, and its implication to users at the fleet and field level. Implications that can be realized now, if the initiative is seized and the challenge met.

CONNECTSUS® is a user-friendly interface which is easily learned and quickly mastered. For the manager, information on who is buying, what they are buying, and the amounts that they've spent is simple to retrieve and review. Real-time order status and shipment information enables the system to be

intergrated into the production/maintenance cycle in a way that our traditional military supply sytems and material tracking programs have had difficulty doing in the past. The spillover effect that could accrue in regards to the potential for maximizing the use of manpower and other resources is an exciting prospect to consider.

This chapter began with a quote from one of the most enlightened Chiefs that the United States Navy Supply Corps has ever had; RADM Samuel H. McGowan. It is fitting that we close with the same.

> *"To that end... be sure that today's work can rightly be regarded as not quite good enough for tomorrow's standards."* [Ref. 32]

# VI. SUMMARY AND CONCLUSIONS

*"We have become so accustomed to this word — creativity — that it has no more effect on us than the most banal Fourth of July oratory. As a matter of fact, it has become our Fourth of July oratory."*

- Allan Bloom
"The Closing of the American Mind"

## A. SUMMARY

This thesis was first conceived as an appropriate avenue for studying the implications of applying the UPC/EAN to DoD/DLA operations. Specifically, DLA has expressed significant interest in the potential benefits of using the UPC/EAN within the DoD. An early estimate of the direct savings that should accrue through the use of commercial packaging with the UPC, instead of repackaging with the NSN for the DoD, is $1.5 billion annually. [Ref. 8] However standardized bar coding and the use of the UPC as a procurement and material management tool should never have been an issue within the DoD. The UPC does not replace the NSN, and vice versa. The UPC is an open system, unique to the specific supplier and product identifier. The NSN is an aggregate functional definition used by the DoD in determining requirements. They fit together, and only a coupling of the interface in the data base between them is needed, an issue that DLSC is already working

on. Instead, adopting the UPC schemata on commercially available items allows for the implementation of successful EC/EDI programs that enable a system of seamless procurement, distribution, and receipt. The UPC is an integral cog in the mechanism of an electronic catalog and purchasing system.

So the issue has evolved beyond the narrow scope of applying the UPC. Now, we must focus on where EC/EDI fits in to the military supply system. In-Transit-Visibility, standardized computer formats, improved scanning equipment, Value Added Networks, and an ever-growing range of new technologies, which are integrateable, have far-reaching implications well beyond the scope of any one thesis.

## B. CONCLUSIONS

The use of an electronic catalog system coupled with UPC/EAN standardized bar coding should produce the following benefits for the DoD:

* Simplify contract negotiations
* Eliminate time-consuming small purchase procedures
* Avoid DoD labeling (with the NSN) of material received without approved labels
* Gain the ITV benefits of EDI Advance Shipment Notices
* Significantly reduce lead time and DoD/DLA inventories
* Enable global sourcing of materials, as appropriate

On a micro level, fleet and field units should also realize other significant advantages with the CONNECTSUS® system. These include:

* Reduced shopping time
* U.S. Government contract price (BPA/IDIQ/etc.) instead of the downtown retail price
* Reduced inventories
* Faster delivery of supplies
* Simplified purchase procedures and fewer man hours

In addition to assisting the fleet, CONNECTSUS® has the potential to assist the entire DoN in achieving long-range EC/EDI goals. As outlined in NAVSUP's 1993 *Strategic Plan for Electronic Data Interchange* [Ref. 37], these goals are based on guiding principles that include:

* Reducing the cost of operations, improving quality, and increasing productivity by removing non-value-added business processes and information exchanges. EC requires not only the automation of paper but a fundamental change in business operations to eliminate redundant and obsolete processes.
* To focus initially on high-payoff opportunities to improve competence with EDI and build morale with project successes. We will start by automating high-volume, paper-based transactions with EDI-capable trading partners.

* Continue to promote decentralized project management. Central management authorities will empower implementing organizations with whatever they need to succeed and intervene only when necessary. Headquarters will play a major role in planning, analyzing, controlling, and preventing redundancy.
* Ensuring that any new operating or management procedures add value that exceeds their negative impact on implementing commands.
* Increase vendor competition in procurement without excluding particular contractor communities. We will, for example, avoid restrictions that might prevent small vendors from doing business with us.

CONNECTSUS® is in line with each of these goals.

## C. RECOMMENDATIONS

The CONNECTSUS® system, functionally superior to PartNet, has a few limitations or concerns which need to be addressed by further study, DoD/DLA interaction with the 3M/GE/EPIC consortium, and plain trial-and-error. These include, but may not be limited to based on further pilot study results:

* Narrow selection of vendor profiles at overseas locations
* The impact of start-up costs on very small, local businesses [Cost data can be found in Appendix D.]
* No proven satellite transmission capability

* System training/troubleshooting capability for deployed units
* Lack of visibility of DoD owned assets

However the above concerns, relative to the existing electronic catalog, are not issues that should stop the DoD or DLA from testing the system on a wider scale. For unlike DLSC's E-Cat system, CONNECTSUS® is available now. And with that availability comes the potential for significant savings. Savings realized in reduced customer ordering time, dollars saved through comparative shopping, the use of DLA/GSA contracts (and the significant savings realized through their immense buying leverage), and the reduction of average customer wait time for material. These benefits are within the DoD's grasp. Money and time saved now is incalculable in regards to future worth. Comparative shopping may help promote prudent, efficient and economically sound buying procedures, while time saved is time that can be used in pursuit of the primary mission, for training, and for maintenance, priceless commodities in today's military.

In this vein, we strongly recommend CONUS implementation of the CONNECTSUS® system at each Fleet and Industrial Supply Center (FISC) Customer Service Desk, SERVMART and HAZMART; each Pierside Procurement office; CINCLANT/CINCPAC; Type Commanders (TYCOMs); and onboard major ship platforms (AD/AS/T-AFS/CV/CVN). Further sites at Army, Marine, Air Force, and Coast Guard facilities should also be initiated at similar

locations and like-sized commands.

Given a 12- to 24-month evaluation program, lessons learned and a detailed cost/benefit analysis can then be conducted. Further implementation to other platforms and base installations, will benefit from this trial evaluation. Most importantly, DLSC will gain invaluable experience and data for their own E-Cat system — should it proceed on course — that will help them avoid the pitfalls encountered and significantly ease fleet and field implementation, and learning curves. The effect of ordering material based on UPCs can also be analyzed, along with cost savings associated with reduced intermediate inventories and processing costs.

*Finis*

## LIST OF REFERENCES


[1] Department of Defense, 1995. *Logistics Strategic Plan*. Washington, D.C.: Office of the Under Secretary of Defense.

[2] Gore, Al, Jr., 1994. "The New Job of the Federal Executive." *Public Administration Review*, vol. 54, no. 4, pp. 317-321.

[3] Boyle, Robert D., 1995. "Avoiding Common Pitfalls of Reengineering." *Management Accounting*, vol. LXXVII, no. 4, pp. 24-33.

[4] Cooper, Mitch, LCDR, MSC, USN, 1995. *Taming the Medical Shrew*. Presentation at the Federal Medical Material Managers Forum sponsored by the American Association of Medical Administrators, 16-17 November.

[5] Murray, Frank, 1995. *LOGMARS Test Subgroup (LST) Meeting Minutes*. DOSO, Richmond, VA., 23 June.

[6] Uniform Council Code, Inc., 1995. *UCC Universal Product Code: Industrial and Commercial Guidelines*. July.

[7] Uniform Council Code, Inc., 1995. *UCC/EAN-128 Application Identifier Standard*.

[8] Messerli, Allen L., 1995. *Business Reengineering using Product Identification, Bar Coding, and Electronic Data Interchange*. Presentation of the Advanced Technologies Division, 3M Corporation to the Department of Defense.

[9] Marino, R. A., 1995. *Universal Product Code (UPC) Meeting Minutes*. DGSC, Richmond, VA., 5 February.

[10] Meier, John, G., III, 1994. *The Implementation of Electronic Data Interchange (EDI) with Defense Transportation Operations*. Master's Thesis, Naval Postgraduate School, Monterey, CA., March.

[11] Schmoll, Lynn, 1995. *Electronic Commercial Catalog Initiative*. Electronic Mail (e-mail). 22 November.

[12] General Services Administration, 1993. *Supply Catalog*. Fort Worth, TX.: U.S. General Services Administration Federal Supply Service.

[13] Arnavas, Donald P., and William J. Ruberry, 1994. *Government Contract Guidebook*. Washington, D.C.: Federal Publications Inc.

[14] 3M Corporation, Federal Systems Department, 1995. *User/Buyer Global Electronic Catalog Brief Overview & Synopsis*.

[15] Electronic Purchasing Information Corporation, 1995. *Requestor Application Instructor Guide*.

[16] Clark, W. Todd, 1996. 3M Los Angeles Sales Center. Manager, U.S. Government Sales, Asia/Pacific and Latin America Areas. Letter to LCDR Dan Palko. 16 January.

[17] Hardcastle, Thomas P., 1992. *EDI Planning and Implementation Guide*. Bethesda, MD.: Logistics Management Institute, August.

[18] Logistics Management Institute. *Electronic Data Interchange: Toward a Paperless Community*.

[19] Clinton, William J., 1993. *Streamlining Procurement Through Electronic Commerce*. Executive Memorandum. 26 October.

[20] Carney, Katharine, 1994. *Highlights of the Federal Acquisition Streamlining Act of 1994*. Washington, D.C.: Office of Assistant General Counsel (Research, Development & Acquisition). October.

[21] Defense Logistics Support Center (DLSC) Electronic Commercial Catalog (E-Cat) Homepage, http://www.dlsc.dla.mil/dlsc/ecc.htm

[22] Defense Technical Information Center (DTIC) Homepage. *Executive Summary*. http://www.dtic.dla.mil/pub/edi/html/execsum.htl

[23] Federal Electronic Commerce/Electronic Data Interchange Homepage of the Electronic Commerce Acquisition Program Management Office (ECAPMO), http://www.gsa.gov/ecapmo/ecapmo.htm

[24] ManTech International Corporation, 1996. *Implementation Plan for the Electronic Commercial Catalog Project*. Fairmont, WV.: Technology Applications Operations Center. 22 January.

[25] PartNet Homepage. http://www.part.net

[26] Schmoll, Lynn, 1996. *E-Cat: Electronic Commercial Catalog*. DLA Slide Show Presentation. January.

[27] Logistics Management Institute, 1988. *A Business*

*Case for Electronic Commerce*. LMI Slide Show Presentation.

[28] Drake, Daniel J., 1992. *Electronic Data Interchange: Opportunities in Defense Procurement*. Bethesda, MD.: Logistics Management Institute, May.

[29] Uniform Code Council, Inc., 1995. *Uniform Code Council: Integrated Supply Chain "EDI meets Product Identification."*

[30] Clark, W. Todd, 1996. 3M Los Angeles Sales Center. Manager, U.S. Government Sales, Asia/Pacific and Latin America Areas. Letter to LCDR Dan Palko. 7 February.

[31] Preston, Colleen, 1995. "Reengineering DoD's Procurement System." *Defense '95*, issue 2.

[32] Allston, Frank J, RADM, SC, USN (Ret.), 1994. "Live Wire of the Navy." *The Navy Supply Corps Newsletter*, vol. 57, no. 2, March/April.

[33] Clark, Theodore H, 1995. *Procter & Gamble: Improving Consumer Value Through Process Design*. Harvard Business School Case Review, 9-195-126, 31 March.

[34] Clark, Theodore H, 1994. *Campbell Soup Company: A Leader in Continuous Replenishment Innovations*. Harvard Business School Case Review, 9-195-124, 14 October.

[35] Minutes of the Global EDI Technical Committee Meeting, Cincinnati, Ohio. August 23 & 24, 1995.

[36] Jones, David W., Capt, USAF, 1992. *Letter Report Incorporating UPC Symbols into the SBSS*. Gunter Air Force Base, AL.: Department of the Air Force, Air Force Logistics Management Center, May.

[37] Naval Supply Systems Command, 1993. *Strategic Plan for Electronic Data Interchange*. Washington, D.C., January.

## APPENDIX A. LIST OF ACRONYMS

| | |
|---|---|
| AI | Application Identifier |
| APL | Allowance Parts List |
| AVCAL | Aviation Consolidated Allowance List |
| BPA | Blanket Purchase Agreement |
| BRAC | Base Realignment and Closure Committee |
| BSS | Base Service Store |
| BUR | Bottom-Up Review |
| CAD | Computer Aided Design |
| CAGE | Contractor and Government Entity |
| CID | Commercial Item Description |
| COSAL | Coordinated Shipboard Allowance List |
| DAAS | Defense Automated Addressing System |
| DGSC | Defense General Supply Center |
| DLA | Defense Logistics Agency |
| DLSC | Defense Logistics Service Center |
| DoD | Department of Defense |
| DODAAC | Department of Defense Authorized Accounting Center |
| DoN | Department of Navy |
| DMRD | Defense Management Report Decision |
| EAN | European Article Number |
| E-CAT | Electronic Catalog [DLSC Trade Name] |
| EC | Electronic Commerce |
| EC/EDI | Electronic Commerce/Electronic Data Interchange |
| EDI | Electronic Data Interchange |
| ELCAT | Electronic Catalog |
| EOQ | Economic Order Quantity |
| EPIC | Electronic Purchasing Information Company |
| FACNET | Federal Acquisition Circular Network |
| FAR | Federal Acquisition Regulations |
| FASA | Federal Acquisition Streamlining Act of 1994 |
| FEDSTRIP | Federal Standard Requisitioning and Issue Procedures |
| FISC | Fleet and Industrial Supply Center |
| FLIS | Federal Logistics Information System |
| FOB | Free-On-Board |
| FSC | Federal Supply Class |
| FSG | Federal Supply Group |
| GEIS | General Electric Information Systems |
| GSA | General Services Administration |
| ICP | Inventory Control Point |
| IDIQ | Local Requirements Contracts |
| ITF | Interleaved 2-of-5 |
| JIT | Just-In-Time |
| MHE | Material Handling Equipment |
| MILSTRIP | Military Standard Requisitioning and Issue |

| | |
|---|---|
| | Procedures |
| MSDS | Material Safety Data Sheet |
| MTMC | Military Traffic Management Command |
| NIIN | National Item Identification Number |
| NEP | DoD Network Entry Points |
| NSN | National Stock Number |
| OEM | Original Equipment Manufacturer |
| POPS | Paperless Order Placement System |
| PSCN | Permanent System Control Number |
| RFQ | Request for Quote |
| SAMMS | Standard Automated Material Management System |
| SIC | Supplier Identification Code |
| SPEDE | SAMMS Procurement by Electronic Data Exchange |
| SSC-14 | Shipping Container Code - 14 |
| SUADPS-RT | Shipboard Uniform Automated Data Processing System - Real Time |
| U/B ELCAT | User/Buyer Electronic Catalog |
| UCC | Uniform Council Code |
| UPC | Uniform Product Code |
| VAN | Value Added Network |

## APPENDIX B. CURRENT UCC/EAN APPLICATION IDENTIFIERS

| AI | Content | Format |
|---|---|---|
| 00 | SSCC-18 | n2+n18 |
| 01 | SCC-14 | n2+n14 |
| 02 | Item Number of Goods Contained within Another Unit (Must Use with AI 37) | n14 |
| 10 | Batch or Lot Number | n2+an..20 |
| 11(*) | Production Date (YYMMDD) | n2+n6 |
| 13(*) | Packaging Date (YYMMDD) | n2+n6 |
| 15(*) | Sell By Date (Quality) (YYMMDD) | n2+n6 |
| 17(*) | Expiration Date (Safety) (YYMMDD) | n2+n6 |
| 20 | Product Variant | n2+n2 |
| 21 | Serial Number | n2+an..20 |
| 22 | HIBCC - Quantity, Date, Batch and Link | n2+an..29 |
| 23(**) | Lot Number (Transitional Use) | n3+n..19 |
| 240 | Additional Product Identification assigned by the Manufacturer | n3+an..30 |
| 250 | Secondary Serial Number | n3+an..30 |
| 30 | Quantity | n2+n..8 |
| 310(***) | Net Weight, Kilograms | n4+n6 |
| 311(***) | Length or 1st Dimension, Meters | n4+n6 |
| 312(***) | Width, Diameter or 2nd Dimension, Meters | n4+n6 |
| 313(***) | Depth, Thickness, Height or 3rd Dimension, Meters | n4+n6 |
| 314(***) | Area, Square Meters | n4+n6 |
| 315(***) | Volume, Liters | n4+n6 |
| 316(***) | Volume, Cubic Meters | n4+n6 |
| 320(***) | Net Weight, Pounds | n4+n6 |
| 321(***) | Length or 1st Dimension, Inches | n4+n6 |
| 322(***) | Length or 1st Dimension, Feet | n4+n6 |
| 323(***) | Length or 1st Dimension, Yards | n4+n6 |
| 324(***) | Width, Diameter, or 2nd Dimension, Inches | n4+n6 |
| 325(***) | Width, Diameter, or 2nd Dimension, Feet | n4+n6 |
| 326(***) | Width, Diameter, or 2nd Dimension, Yards | n4+n6 |
| 327(***) | Depth, Thickness, Height or 3rd Dimension, Inches | n4+n6 |
| 328(***) | Depth, Thickness, Height or 3rd Dimension, Feet | n4+n6 |
| 329(***) | Depth, Thickness, Height or 3rd Dimension, Yards | n4+n6 |
| 330(***) | Gross Weight, Kilograms | n4+n6 |
| 331(***) | Length or 1st Dimension, Meters, Logistics | n4+n6 |
| 332(***) | Width, Diameter or 2nd Dimension, Meters, Logistics | n4+n6 |
| 333(***) | Depth, Thickness, Height or 3rd Dimension, Meters, Logistics | n4+n6 |
| 334(***) | Area, Square Meters, Logistics | n4+n6 |
| 335(***) | Gross Volume, Liters | n4+n6 |
| 336(***) | Gross Volume, Cubic Meters | n4+n6 |

| | | |
|---|---|---|
| 340(***) | Gross Weight, Pounds | n4+n6 |
| 341(***) | Length or 1st Dimension, Inches, Logistics | n4+n6 |
| 342(***) | Length or 1st Dimension, Feet, Logistics | n4+n6 |
| 343(***) | Length or 1st Dimension, Yards, Logistics | n4+n6 |
| 344(***) | Width, Diameter, or 2nd Dimension, Inches, Logistics | n4+n6 |
| 345(***) | Width, Diameter, or 2nd Dimension, Feet, Logistics | n4+n6 |
| 346(***) | Width, Diameter, or 2nd Dimension, Yards, Logistics | n4+n6 |
| 347(***) | Depth, Thickness, Height or 3rd Dimension, Inches, Logistics | n4+n6 |
| 348(***) | Depth, Thickness, Height or 3rd Dimension, Feet, Logistics | n4+n6 |
| 349(***) | Depth, Thickness, Height or 3rd Dimension, Yards, Logistics | n4+n6 |
| 350(***) | Area, Square Inches | n4+n6 |
| 351(***) | Area, Square Feet | n4+n6 |
| 352(***) | Area, Square Yards | n4+n6 |
| 353(***) | Area, Square Inches, Logistics | n4+n6 |
| 354(***) | Area, Square Feet, Logistics | n4+n6 |
| 355(***) | Area, Square Yards, Logistics | n4+n6 |
| 356(***) | Net Weight, Troy Ounce | n4+n6 |
| 360(***) | Volume, Quarts | n4+n6 |
| 361(***) | Volume, Gallons | n4+n6 |
| 362(***) | Gross Volume, Quarts | n4+n6 |
| 363(***) | Gross Volume, Gallons | n4+n6 |
| 364(***) | Volume, Cubic Inches | n4+n6 |
| 365(***) | Volume, Cubic Feet | n4+n6 |
| 366(***) | Volume, Cubic Yards | n4+n6 |
| 367(***) | Gross Volume, Cubic Inches | n4+n6 |
| 368(***) | Gross Volume, Cubic Feet | n4+n6 |
| 369(***) | Gross Volume, Cubic Yards | n4+n6 |
| 37 | Quantity of Units Contained (For Use With AI 02 Only) | n..8 |
| 400 | Customer's Purchase Order Number | n3+an..30 |
| 410 | Ship To (Deliver To) Location Code Using EAN-13 | n3+n13 |
| 411 | Bill To (Invoice To) Location Code Using EAN-13 | n3+n13 |
| 412 | Purchase From (Location Code of Party from Whom Goods are Purchased) | n3+n13 |
| 414 | EAN Location Code for Physical Identification | n3+n13 |
| 420 | Ship To (Deliver To) Postal Code Within a Single Postal Authority | n3+an..9 |
| 421 | Bill To (Invoice To) Postal Code With 3-Digit ISO Country Code Prefix | n3+n3+an..9 |
| 8001 | Roll products - Width, Length, Core Diameter Direction and Splices | n4+n14 |
| 8002 | Electronic Serial Number for Cellular | n4+an..20 |

| | | |
|---|---|---|
| | Mobile Telephones | |
| 8003 | UPC/EAN Number and Serial Number of Returnable Asset | n4+n14+an..16 |
| 8004 | UCC/EAN Serial Identification | an..30 |
| 8005 | Identifies the Price Per Unit of Measure | n6 |
| 8100 | Coupon Extended Code - Number System Character and Offer | n4+n1+n5 |
| 8101 | Coupon Extended Code - Number System Character, Offer, and End of Offer | n4+n1+n5+n4 |
| 8102 | Coupon Extended Code - Number System Character preceded by zero | n4+n1+n1 |
| 90 | Mutually Agreed, Between Trading Partners or FACT ID's | n2+an..30 |
| 91 | Intra-Company (Internal) | n2+an..30 |
| 92 | Intra-Company (Internal) | n2+an..30 |
| 93 | Intra-Company (Internal) | n2+an..30 |
| 94 | Intra-Company (Internal) | n2+an..30 |
| 95 | Internal-Carriers | n2+an..30 |
| 96 | Internal-Carriers | n2+an..30 |
| 97 | Intra-Company (Internal) | n2+an..30 |
| 98 | Intra-Company (Internal) | n2+an..30 |
| 99 | Internal | n2+an..30 |

(*) : To indicate only year and month, DD must be filled with "00"
(**) : Plus one digit for length indication
(***) : Plus one digit for decimal point indication

Data Value Representation:

| | |
|---|---|
| a | alphabetic characters |
| n | numeric characters |
| an | alphanumeric characters |
| a3 | 3 alphabetic characters, fixed length |
| n3 | 3 numeric characters, fixed length |
| an3 | 3 alphanumeric characters, fixed length |
| a..3 | up to 3 alphabetic characters |
| n..3 | up to 3 numeric characters |
| an..3 | up to 3 alphanumeric |

## APPENDIX C. INTERNET REFERENCE SITES

The following Internet address sites provide extensive information concerning Federally sponsored Electronic Commerce/Electronic Data Interchange (EC/EDI) initiatives. These sites will allow access to reference material, acquisition reform legislation, and on-going projects.

1. Federal Electronic Commerce/Electronic Data Interchange Homepage of the Electronic Commerce Acquisition Program Management Office (ECAPMO), http://www.gsa.gov/ecapmo/ecapmo.htm

2. Defense Logistics Support Center (DLSC) Electronic Commercial Catalog (E-Cat) Homepage, http://www.dlsc.dla.mil/dlsc/ecc.htm

3. Defense Technical Information Center (DTIC) Homepage, http://www.dtic.dla.mil

4. Navy Acquisition Reform Homepage, http://www.acq-ref.navy.mil

5. FACNET Homepage, http://www.reg.uci.edu/FACNET

The following Internet address sites provide information concerning commercial Electronic Commerce/Electronic Data Interchange (EC/EDI) initiatives that are either sponsored by the Department of Defense or have received considerable attention from the DoD.

6. PartNet Homepage, http://www.part.net

7. FAST Electronic Broker Homepage, http://info.internet.isi.edu/fast

## APPENDIX D. COST DATA

Pricing for EPIC CONNECTSUS®:

Vendor Registration:

| | |
|---|---|
| Small, regional suppliers:<br>- Up to 1,000 items listed | $2,500.00/year |
| Larger, base suppliers:<br>- Up to 1,000 items listed | $5,000.00/year |

User Access:

| | |
|---|---|
| Set-up cost for one(1) work-station<br>- Buyer or Supplier interface | $ 250.00/year |
| GEIS VAN charges | $ 9.50/month |

Pricing for UCC registration to assign UPCs:

Membership is based on latest annual U.S. domestic $ sales volume of a company.

| ANNUAL SALES | FEE |
|---|---|
| $ 0 - 2 Million | $ 300/year |
| 2 - 5 Million | 800/year |
| 5 - 50 Million | 1,500/year |
| 50 - 100 Million | 3,000/year |
| 100 - 500 Million | 6,000/year |
| Over 500 Million | 10,000/year |

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| 10. | 3M Information Technology<br>3M Center, Building 224-4S-18 | 1 |

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